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WESTERN WATER BULLETIN 1988

Flow of The Colorado River and other Western Boundary Streams and Related Data

COLORADO RIVER

TIJUANA RIVER

SANTA CRUZ RIVER

SAN PEDRO RIVER

WHITEWATER DRAW

1988

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FOREWORD

This bulletin is the twenty-ninth annual compilation of stream discharges and other hydrographic data relating to international aspects of the Colorado River below Imperial Dam, the Tijuana River, and other streams crossing the western land boundary of the United States and Mexico. The compilation was prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission, solely for the purpose of presenting statistical data relating to stream flow and kindred subjects for the Colorado River from Imperial Dam to the Gulf of California, the Tijuana River and its important tributaries in the United States and Mexico, and other streams, including the Alamo and New Rivers which cross the California-Baja California boundary, and the Santa Cruz River and Whitewater Draw which cross the Arizona-Sonora boundary. This bulletin contains information for the year 1988.

Stream gaging on the Colorado River below Imperial Dam began in 1902 when the station at Yuma, Arizona was established. Stage records were obtained at this station from January 1878 until December 1973, when it was discontinued. Continuous stream gaging on the Tijuana River and its important tributaries in the United States and in Mexico began in 1936. Each government operates the gaging stations located within its own country.

COLORADO RIVER BELOW IMPERIAL DAM

Below Imperial Dam, the Colorado River flows southward 10 miles to the mouth of the Gila River, thence westward 11 miles to Pilot Knob Mountain, and south 1 mile to the point where the northerly international land boundary, between California and Baja California, intersects the river. From this point the river continues to flow southward and forms the boundary between the United States and Mexico for a distance of about 22 miles to the point where the southerly international land boundary between Arizona and Sonora intersects the river. From this point the river continues to flow southward about 90 miles to discharge into the Gulf of California.

The ordinary flows of Colorado River below Imperial Dam are largely controlled by releases at Hoover Dam, completed in 1935. The releases are further regulated at Davis Dam, completed in 1950, and by Parker and Imperial Dams, completed in 1938. Small amounts of runoff may occasionally be contributed to the flow in the lower river from the usually dry arroyos draining the 10,900 square miles along the river from Hoover Dam to the mouth of the Gila River. In addition, flows ranging from usually minor amounts to infrequent torrential floods may enter the lower Colorado River from the Bill Williams River, draining about 717 square miles below Alamo Dam and Lake, completed in 1963; and from the Gila River, draining about 7,300 square miles below Painted Rock Dam and Reservoir, completed in January 1960.

At Imperial Dam, diversions are made to Gila Gravity Main Canal and All-American Canal for irrigation projects in Arizona, including the Yuma Valley, Gila and Wellton-Mohawk projects; and in California, including the Imperial Valley, Coachella Valley and Reservation Division of Yuma Project. Also, under the provisions of the 1944 Water Treaty, there may be diverted to the All-American Canal at Imperial Dam for delivery to Mexico in the Alamo Canal, or substitute canal, at the northerly boundary, a portion of Mexico's scheduled deliveries of waters of the Colorado River, which in 1988 amounted to 1,700,000 acre-feet, in accordance with Article 10 of the 1944 Water Treaty. No diversions were made to a substitute canal in 1988.

Below Laguna Dam, measured and unmeasured flows are returned to the river principally as waste and drainage water from the irrigation projects in the United States. Waste and drainage waters from irrigation projects in the United States also cross the boundary into Mexico near San Luis, Arizona without returning to the river in the United States.

In the limitrophe seciton of the river, 1.1 miles downstream from the northerly boundary, Morelos Dam, the principal diversion structure for Mexico, was completed and placed in operation on November 8, 1950. Since that date almost all the Colorado River flows that cross the northerly boundary (except emergency deliveries to Tijuana from August 1972 to August 1980) have been diverted to the Alamo Canal at Morelos Dam.

TIJUANA RIVER BASIN

The total drainage area of the Tijuana River basin is 1,731 square miles, of which 27 percent lies in the United States and 73 percent in Mexico. This river is formed by the principal tributaries, Cottonwood Creek, which rises in the United States and Rio de las Palmas, which rises in Mexico. Cottonwood Creek crosses the international land boundary 21 miles from the Pacific Ocean to join the Rio de Las Palmas in Mexico. From the confluence of these tributaries, the Tijuana River flows northwesterly 5 miles to cross the land boundary into the United States near San Ysidro, California and Tijuana, Baja California, and then flows westerly 6 miles to discharge into the Pacific Ocean 2 miles north of the boundary. The flow of Cottonwood Creek is partially controlled by Barrett and Morena Reservoirs in the United States, and the flow of the Rio de las Palmas is partially controlled by Rodriguez Reservoir in Mexico.

WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

Whitewater Draw rises in the United States and flows south into Mexico, crossing the international boundary near Douglas, Arizona, eventually discharging into the Gulf of California through the Yaqui River in Mexico. The total drainage area above the Douglas Gaging Station is 1,023 square miles. A number of mountain streams in the upper reaches of the basin are diverted for irrigation, but they would normally sink or go to ground water before reaching the main water course.

FOREWORD

San Pedro River at Palominas, Arizona

The San Pedro River rises in Mexico and flows north into the United States, crossing the boundary near Palominas, Arizona and thence northwesterly into the Gila River. The river in the vicinity of the international boundary drains an area of 741 square miles, of which 649 square miles are in Mexico.

Santa Cruz River Near Nogales and Lochiel, Arizona

The Santa Cruz River rises in the United States and flows south into Mexico, crossing the international boundary near Lochiel, Arizona and returning to the United States near Nogales, Arizona, eventually discharging into the Gila River southwest of Phoenix, Arizona. The drainage area of the Santa Cruz River above Nogales station is 533 square miles. Of this amount, 348 square miles lie in Mexico. There are a few ground water irrigation diversions above the Lochiel station in Arizona and an unknown amount of water diverted for irrigation in Mexico.

Acknowledgments

Other agencies which have contributed to the data published herein include the Bureau of Reclamation and the Geological Survey of the U. S. Department of the Interior; the National Weather Service, Department of Commerce; the Yuma County Water Users' Association; the Imperial Irrigation District; the city of San Diego, California; the Otay Municipal Water District; and the Ministry of Agriculture and Hydraulic Resources of Mexico. Specific notation is made of each of the above named agencies, where the data appear. The courtesy and cooperation of those who have made these contributions are acknowledged with appreciation.

Units of Measure

Data collected by the Mexican Section are computed and published in a Spanish version of the water bulletin in metric units. The Mexican data are converted and reported in this bulletin in English units. Conversion factors conform generally to those in the National Bureau of Standards Miscellaneous Publication 286 "Units of Weight and Measure (United States Customary and Metric) - Definitions and Tables of Equivalents." However, for convenience some of the factors have been shortened and modified to facilitate conversion, reconversion to the original units when necessary, and checking of data. Conversion of the mean daily discharges, the monthly average discharge, and the monthly and annual volumes from metric to English units is direct. For this reason the monthly average discharge in cubic feet per second and monthly volumes in acre-feet shown for gaging stations operated by the Mexican Section cannot necessarily be obtained in the usual manner from the total monthly flow in second-foot days. For the same reason, evaporation and rainfall data, when totaled, may not be equivalent to the direct conversion from metric to English units. The following factors have been used for data in this bulletin:

METRIC UNITS	ENGLISH UNITS
LENGTHS	
1 Centimeter	0.39370 Inch
1 Meter	3.28084 Feet
1 Kilometer	0.62137 Mile
AREAS	
1 Square Meter	10.76391 Square Feet
1 Hectare	2.47105 Acres
1 Square Kilometer	0.38610 Square Mile
VOLUMES	
1 Cubic Meter	61023.74 Cubic Inches
1 Cubic Meter	35.31467 Cubic Feet
1 Cubic Meter	1.30795 Cubic Yards
1000 Cubic Meters	0.81071 Acre-Foot
1 Liter	0.26417 U.S. Gallon
WEIGHTS	
1 Kilogram	2.20462 Pounds
1 Metric Ton	2204.623 Pounds
1 Metric Ton	1.10231 Short Tons (2,000 lbs.)

Both English and metric units are used to report the figures in the descriptive headings and for the yearly figures of the annual and period summaries of all gaging station pages. The yearly figures for the summaries are obtained by direct conversion from English to metric system of units, except for those stations operated by the Mexican Section, where the figures furnished in the metric system of units are used.

GENERAL HYDROLOGIC CONDITIONS FOR 1988

Colorado River

Normally, there is no measurable amount of runoff from the portion of the Colorado River basin in the United States and Mexico below Hoover Dam, not including Bill Williams and Gila Rivers. There was no significant amount in 1988. In the lower basin of the Colorado River in Mexico, from Morelos Diversion Dam to the Gulf of California, the average precipitation during 1988 measured at 5 index stations was 0.91 inches, compared to an average of 2.72 inches during the last 30 years (1959 to 1988).

The flow of the Colorado River reaching Imperial Dam was 6,608,900 acre-feet, about 78% of the 54-year average (1935-1988) of 8,445,005 acre-feet. At the northerly international boundary, the total flow of the river during 1988 was 2,217,146 acre-feet, about 53% of the 1935-1988 average of 4,157,896 acre-feet. At the southerly international boundary, the flow during 1988 was 384,463 acre-feet, or about 13% of the 1935-1988 average of 3,023,490 acre-feet.

The total of all flows of the Colorado River entering Mexico in 1988 amounted to 2,459,007 acre-feet, 53% of the 1935-1988 average of 4,679,772 acre-feet, as measured 1) in the Colorado River at the northerly international boundary, 2) in the Wellton-Mohawk Main Outlet Drain Extension near Morelos Dam, 3) in the wasteways that discharge into the limitrophe section of the river from the United States bank, 4) in the canal which discharges waste and drainage waters from the Yuma Project across the southerly land boundary into Mexico near San Luis, Arizona, 5) in the Wellton-Mohawk Bypass Drain at the southerly land boundary near San Luis, Arizona, and 6) the 242 Well Field near San Luis, Arizona.

During 1988, other waters arrived at the Mexican points of diversion and amounted to 113,685 acre-feet. These waters consisted mainly of excess waters released from reservoirs on the Colorado River. A maximum instantaneous flow of 11,100 second-feet occurred in the Colorado River at the northerly boundary station on January 10, 11, 1988.

Stored waters at the end of the year in the three major reservoirs on the Colorado River below Lee's Ferry amounted to 25,026,800 acre-feet, 88% of the usable capacity of 28,588,400 acre-feet. The greater part (22,880,000 acre-feet) of the storage was contained in Lake Mead (Hoover Dam). There were no reported shortages of Colorado River water for irrigation during 1988 due to drought or accident to the irrigation system.

The total reported acreage irrigated from waters of the Colorado River below Imperial Dam in 1988 was 1,213 086 acres; 683,236 acres in the United States and 529,850 acres in Mexico. An estimated 33% of acreage in Mexico is served by pumping from ground water.

Tijuana River Basin

During 1988, the temperatures at Barrett Dam, California (elevation 1,750 feet) in the upper portion of the basin in the United States averaged 61.4 degrees, which equaled the 58-year mean. In the extreme upper portion of the basin in Mexico at El Pinal, Baja California (elevation 4,429 feet), the recorded temperatures during the year averaged 54 degrees, 2 degrees below the long-term average; and at Rodriguez Dam, Baja California (elevation 459 feet), the recorded temperatures averaged 68 degrees, 4 degrees above the normal for many years.

At Barrett Dam in the upper portion of the basin in the United States, the recorded precipitation was 14.40 inches, 98% of normal; and at Chula Vista near the lower end of the basin, 8.88 inches, or 90% of normal. The recorded precipitation at El Pinal in the upper portion of the basin in Mexico, was 13.24 inches, approximately 69% of the normal during the 25-year period; and at Rodriguez Dam in the lower portion of the basin in Mexico, 7.25 inches, 80% of the 51-year average.

Runoff above Barrett and Rodriguez Reservoirs during 1988 averaged 26% of normal. Above Morena Reservoir the runoff was 4,657 acre-feet, or about 44% of the 52-year 1937-1988 mean of 10,673 acre-feet. Above Barrett Reservoir the runoff was 3,827 acre-feet, or about 31% of the 52-year 1937-1988 mean of 12,243 acre-feet. At Rodriguez Reservoir, the runoff was 5,463 acre-feet, or about 23% of the 51-year mean of 23,292 acre-feet.

The flow of the Tijuana River at the international boundary was 26,350 acre-feet during 1988.

Whitewater Draw

During 1988, the average annual temperature over the watershed was 1.0 degree above normal, while the annual precipitation was 117% of normal. Runoff for the year at the gaging station near Douglas, Arizona, of 1,916 acre-feet, was about 31% of average.

GENERAL HYDROLOGIC CONDITIONS FOR 1988

San Pedro River

During 1988, the average annual temperature was 0.6 degree below normal. The annual precipitation, as measured at Coronado National Monument Headquarters, was 113% of the 1961-1988 mean of 21.26 inches. The stream flow at Palominas, Arizona, near the international boundary was 24,465 acre-feet, 106% of the 1951-1988 average.

Santa Cruz River

During 1988, the average annual temperature over the watershed was somewhat above normal, and the annual precipitation was about 135% of the 50-year 1939-1988 mean. Runoff measured at the Nogales gaging station, where the stream re-enters the United States, was 11,898 acre-feet. The total runoff for the year measured at the gaging station near Lochiel, Arizona, where the stream enters Mexico from the United States, was 1,265 acre-feet. Therefore, neglecting stream flow depletions in Mexico, the records indicate a contribution of about 10,633 acre-feet from the loop of the river lying in Mexico, or approximately 89% of the flow reaching the Nogales station.

Alamo and New Rivers

During 1988, the average annual temperature over the drainage areas of the Alamo and New Rivers, as recorded at El Centro, California, was 73.4 degrees, 1.2 degrees above normal; and over the drainage area of the New River, as recorded at Mexicali, Baja California, it was 73 degrees, 2 degrees above the 63-year average.

At El Centro, the precipitation was 2.21 inches, about 81% of the 58-year average; and in Mexicali, the annual precipitation was 2.20 inches, 70% of the 63-year average. The total flow of the New River at the international boundary in 1988 was 226,795 acre-feet, which was about 207% of the 1943-1988 average.

Salton Sea

During 1988, the average annual temperature around the Salton Sea was 0.1 degree above the long-term average, while the annual precipitation recorded at Brawley, California was approximately 53% of the long-term mean of 2.69 inches. The water surface of the Salton Sea remained more or less the same during the year. The maximum stage 227.1 feet below mean sea level, was recorded on April 16-22, May 13-16, and May 19-27, 1988, inclusive. The minimum stage, 228.2 feet below mean sea level, was recorded on November 18-December 22, 1988, inclusive.

09-5300.00 RESERVATION MAIN DRAIN NO. 4 (CALIFORNIA DRAIN)

DESCRIPTION: Water-stage recorder (digital) located 500 feet (152 m) upstream from railroad culvert and one mile (1.6 km) northwest of Yuma, Arizona. Discharge measurements are made from a footbridge immediately below the gage. The drainage canal discharges into the outfall channel of the Yuma Main Canal Wasteway 200 feet (61.0 m) downstream from the spillway structure, and thence into the Colorado River on the right bank, 1,000 feet (305 m) upstream from Colorado River below Yuma Main Canal Wasteway, and 6.5 miles (10.5 km) upstream from the northerly international boundary. Prior to October 1955, published as "California Drainage Canal near Yuma, Arizona."

RECORDS: Based on current meter measurements and a continuous record of gage heights. Records are computed and furnished by the U. S. Geological Survey. Records available: Monthly discharge, January 1913 to April 1920, October 1921 to March 1925, and January 1934 to September 1947; daily and monthly discharge, October 1947 through 1988.

REMARKS: Reservation Main Drain No. 4 collects drainage and wastewater from the area east of the Yuma Main Canal on the Reservation Division of the Yuma Project, located in California. Since 1939, collection of seepage from the All-American Canal has caused large increases in drainage flows. Average annual flow prior to 1937 was 12,800 acre-feet (15,789,000 m3). Monthly and annual averages since 1937 are shown in the table below.

EXTREMES: Prior to 1937: Maximum annual flow 20,190 acre-feet (24,904,000 m3), 1916; minimum annual flow 8,920 acre-feet (11,003,000 m3), 1913.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	62	* 53	60	58	67	67	60	59	67	71	74	64
2	62	* 53	60	58	63	68	60	59	68	69	74	68
3	61	* 53	61	59	62	71	63	59	62	68	76	61
4	62	53	63	59	64	66	59	58	59	68	77	62
5	61	56	62	60	63	67	58	59	59	68	73	59
6	60	53	62	60	64	66	59	59	64	69	72	59
7	61	55	63	58	64	66	58	58	60	69	72	59
8	62	55	62	58	65	64	58	58	61	71	73	59
9	62	54	63	58	67	64	60	59	62	71	71	58
10	60	56	62	59	66	64	59	60	61	72	71	60
11	59	56	61	59	64	64	59	59	61	71	69	57
12	58	55	60	59	65	63	60	59	63	69	69	56
13	58	56	59	60	67	61	61	61	62	71	67	58
14	* 58	55	59	61	67	60	61	64	61	72	67	56
15	* 58	55	60	62	66	60	62	65	61	71	67	56
16	* 57	56	59	63	65	60	62	60	62	71	68	58
17	* 57	57	60	64	67	60	61	59	63	71	66	56
18	* 57	58	59	62	67	63	60	59	63	73	65	55
19	* 57	57	59	63	69	62	60	60	63	77	65	55
20	* 56	56	59	63	68	60	59	61	68	87	68	54
21	* 56	56	59	62	68	60	62	64	65	81	67	54
22	* 56	56	61	62	68	60	60	62	67	79	67	56
23	* 56	57	60	63	68	62	60	61	68	74	65	55
24	* 55	59	60	62	69	62	60	62	68	73	65	57
25	* 55	61	59	63	69	63	60	64	71	75	64	54
26	* 55	60	59	62	69	61	61	63	68	74	66	54
27	* 55	62	59	61	67	60	61	62	68	79	63	55
28	* 54	64	58	62	69	60	62	100	68	76	62	53
29	* 54	62	57	63	70	59	63	185	69	76	61	52
30	* 54		55	65	72	59	64	77	69	74	65	52
31	* 54		57		66		60	64		74		52
Sum	1,792	1,639	1,857	1,828	2,065	1,882	1,872	2,059	1,931	2,264	2,049	1,764

Current Year 1988								Period 1937-1988		
Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High		Low				Average	Maximum	Minimum
			Day		Day						
Jan.			! 1	62	!28	* 54	58	3,554	3,222	4,780	877
Feb.			28	64	! 1	* 53	57	3,251	3,025	4,453	563
Mar.			! 4	63	30	55	60	3,683	3,736	5,250	1,240
Apr.			30	65	! 1	58	61	3,626	3,741	5,250	1,160
May			30	72	3	62	67	4,096	3,830	5,590	992
June			3	71	!29	59	63	3,733	3,701	5,580	885
July			30	64	! 5	58	60	3,713	3,954	6,550	816
Aug.			29	185	! 4	58	66	4,084	3,966	6,810	861
Sept.			25	71	! 4	59	64	3,830	3,744	6,220	889
Oct.			20	87	! 3	68	73	4,491	3,823	5,740	1,040
Nov.			4	77	29	61	68	4,064	3,561	5,490	994
Dec.			2	68	!29	52	57	3,499	3,423	4,960	966
				185		52	63	45,624	43,726	63,700	12,840
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				5.24		1.47	1.78	56,276	53,935	78,573	15,838

ø Mean daily ! And other days * Estimated

09-5250.00 YUMA MAIN CANAL WASTEWAY TO COLORADO RIVER AT YUMA, ARIZONA

DESCRIPTION: The wasteway receives water from the Yuma Main Canal at the check structure on the canal, 1,645 feet (501 m) upstream from the intake of the Colorado River siphon, and 3.2 miles (5.1 km) downstream from the Siphon Drop Power Plant. This wasteway discharges into the Colorado River on the California side, 1,000 feet (305 m) upstream from Colorado River below Yuma Main Canal Wasteway, and 6.5 miles (10.5 km) upstream from the northerly international land boundary.
RECORDS: Discharge is computed as the difference between the measured discharge of the Yuma Main Canal at the Siphon Drop Power Plant upstream and that of the same canal below the Colorado River siphon, with deductions for small irrigation diversions from the canal between the two gaging stations. Records obtained and furnished by U. S. Geological Survey. Records available: April 1913 through 1988.
REMARKS: The wasteway discharges to the river the flow in excess of irrigation water in the Yuma Main Canal.
EXTREMES: Prior to 1935, when storage began in Lake Mead: Average annual flow, 297,800 acre-feet (367,333,000 m3); maximum annual flow, 913,700 acre-feet (1,127,040,000 m3), 1932; minimum annual flow, 114,900 acre-feet (141,728,000 m3), 1917. Since 1935: Maximum mean daily discharge, 2,020 second-feet (57.2 m3/sec), December 24-25, 1948; minimum mean daily discharge, no flow on numerous occasions.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	732	754	561	286	547	62	591	427	690	258	430	963
2	726	727	565	543	389	66	535	287	731	294	773	892
3	716	678	640	839	210	90	597	316	550	443	604	788
4	710	748	647	847	163	106	650	329	411	470	459	652
5	596	741	630	802	257	86	547	358	398	391	738	166
6	584	779	639	693	121	95	345	495	369	303	424	190
7	599	843	641	371	113	63	242	724	303	380	478	137
8	631	842	683	383	41	67	311	775	307	463	335	83
9	702	832	650	447	52	79	416	696	415	220	336	87
10	768	808	356	588	40	51	582	579	405	305	472	84
11	696	588	372	604	46	61	545	242	436	163	574	140
12	618	554	446	489	40	70	385	222	299	115	601	262
13	617	617	502	379	14	233	300	337	258	209	506	930
14	670	705	500	395	14	437	332	484	497	587	584	899
15	696	640	421	550	14	391	336	454	427	377	596	705
16	655	586	316	792	590	467	386	434	618	260	324	741
17	732	563	334	891	742	495	487	452	498	402	331	621
18	753	614	527	801	607	578	449	480	513	417	493	696
19	741	568	659	744	537	687	386	564	529	542	547	675
20	729	467	822	707	618	640	374	588	494	833	557	614
21	741	458	790	612	662	550	389	650	485	876	555	619
22	722	296	786	664	795	466	419	578	512	645	558	591
23	714	95	719	647	765	441	543	508	576	274	578	669
24	902	218	415	705	713	517	820	550	602	425	570	786
25	887	528	336	655	749	601	760	581	637	754	683	950
26	882	564	322	485	662	624	752	468	606	824	608	789
27	793	616	578	285	691	532	660	99	613	641	604	1,000
28	536	726	496	230	723	488	255	187	484	351	281	897
29	592	694	405	289	732	418	220	327	315	537	387	835
30	664		373	400	651	503	296	380	437	393	793	779
31	775		213		224		447	314		344		822
Sum	21,879	17,849	16,344	17,123	12,522	9,964	14,357	13,885	14,415	13,496	15,779	19,062

Month	Current Year 1988								Period 1935-1988		
	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	Day	High	Day	Low			Average	Maximum	Minimum
Jan.			24	902	28	536	706	43,396	45,622	110,700	446
Feb.			7	843	23	95	615	35,403	39,999	89,140	360
Mar.			20	822	31	213	527	32,418	39,499	90,190	357
Apr.			17	891	28	230	571	33,963	39,972	86,580	326
May			22	795	!13	14	404	24,837	47,559	88,280	333
June			19	687	10	51	332	19,763	41,556	86,960	342
July			24	820	29	220	463	28,477	39,024	91,220	369
Aug.			8	775	27	99	448	27,540	39,542	89,890	369
Sept.			2	731	13	258	481	28,592	43,268	83,660	357
Oct.			21	876	12	115	435	26,769	40,803	90,050	567
Nov.			30	793	28	281	526	31,297	40,525	101,500	715
Dec.			27	1,000	8	83	615	37,809	44,932	108,800	462
Yearly				1,000		14	510	370,264	502,301	1,042,850	6,669
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
				28.3		0.40	14.4	456,713	619,578	1,286,335	8,226

ø Mean daily ! And other days

09-5211.00 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY AT YUMA, ARIZONA - DISCHARGES

DESCRIPTION: Water-stage recorder located in California on the right bank of the river, 1,000 feet (305 m) downstream from the mouth of the Yuma Main Canal Wasteway, 0.6 mile (1.0 km) downstream from the abandoned gaging station on the Colorado River at Yuma, 5.2 miles (8.4 km) downstream from the mouth of the Gila River, 19.6 miles (31.5 km) downstream from Imperial Dam, and 6.4 miles (10.3 km) upstream from the northerly international boundary. Zero of the gage is 101.99 feet (31.09 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by U. S. Geological Survey. Records available: October 1963 through 1988. Records from January 1951 through September 1963 deduced from "Colorado River at Yuma" plus flows from "Reservation Main Drain No. 4" and "Yuma Main Canal Wasteway."

REMARKS: Reservoirs on the Colorado River, power developments, transmountain diversions, reservoirs on the Gila River, irrigation diversions, and return flows modify the river flow at this station.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,540	1,550	1,360	1,020	1,250	1,080	1,580	1,350	1,340	1,470	1,000	1,690
2	1,540	1,540	1,370	1,270	1,070	1,040	1,520	1,230	1,870	1,100	1,450	1,680
3	1,600	1,480	1,450	1,540	835	962	1,470	1,300	2,090	1,440	1,400	1,670
4	1,640	1,520	1,520	1,730	643	860	1,460	1,300	1,390	1,640	1,120	1,530
5	1,530	1,500	1,460	1,780	692	847	1,340	1,330	1,710	1,360	1,400	891
6	1,540	1,630	1,490	1,610	699	801	1,100	1,660	2,650	1,320	1,080	872
7	1,560	1,780	1,460	1,320	649	863	953	1,650	1,970	1,100	1,140	750
8	1,670	1,780	1,470	1,410	685	833	1,040	1,590	1,230	1,880	1,020	658
9	1,750	1,740	1,450	1,420	934	791	1,270	1,420	1,230	983	960	761
10	1,800	1,730	1,200	1,490	1,010	793	1,410	1,290	1,340	971	1,150	725
11	1,710	1,560	1,160	1,460	818	816	1,370	1,080	1,210	821	1,310	795
12	1,590	1,510	1,250	1,370	712	820	1,290	917	984	745	1,290	1,180
13	1,550	1,550	1,290	1,550	741	965	1,130	1,470	992	814	1,130	1,530
14	1,620	1,590	1,280	1,520	723	1,200	1,090	1,300	1,530	1,540	1,210	1,550
15	1,660	1,520	1,230	1,630	894	1,150	1,090	1,170	1,640	1,390	1,640	1,340
16	1,520	1,500	1,150	2,010	1,680	1,240	1,160	1,700	1,290	908	1,210	1,350
17	1,560	1,450	1,120	2,130	1,720	1,270	1,250	1,270	1,350	1,030	1,140	1,540
18	1,570	1,510	1,290	2,080	1,610	1,340	1,220	1,360	1,180	1,260	1,210	1,390
19	1,570	1,480	1,430	1,660	1,490	1,440	1,240	1,570	1,540	1,230	1,200	1,420
20	1,590	1,400	1,620	1,570	1,550	1,400	1,190	1,560	1,610	2,430	1,230	1,470
21	1,590	1,370	1,570	1,480	1,470	1,380	1,180	1,570	1,450	2,310	1,460	1,620
22	1,610	1,280	1,560	1,500	1,560	1,260	1,200	1,510	1,550	2,010	1,340	1,960
23	1,540	1,150	1,510	1,510	1,630	1,260	1,290	1,560	1,430	966	1,330	2,310
24	1,720	1,220	1,220	1,530	1,570	1,320	1,590	2,060	1,920	1,060	1,420	1,960
25	1,700	1,450	1,140	1,820	1,650	1,380	1,560	2,300	1,410	1,430	1,630	1,650
26	1,720	1,480	1,110	1,710	1,650	1,430	1,520	1,910	1,510	1,410	2,110	1,570
27	1,610	1,400	1,350	1,450	1,640	1,340	1,450	943	1,470	1,610	1,970	1,940
28	1,360	1,480	1,290	1,460	1,660	1,390	1,050	1,000	1,530	980	1,460	1,620
29	1,410	1,480	1,140	1,390	1,650	1,310	1,010	2,610	1,310	1,160	1,520	1,520
30	1,460		1,120	1,270	2,000	1,290	1,130	1,900	1,300	995	1,760	1,440
31	1,550		990		1,990		1,450	1,480		936		1,470
Sum	49,380	43,630	41,050	46,690	38,875	33,871	39,603	46,360	45,026	40,299	40,290	43,852

Current Year 1988									Period 1951-1988		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High Day	High	Low Day	Low			Average	Maximum	Minimum
Jan.	10.05	9.23	10	1,820	28	1,280	1,590	97,944	252,600	1,068,099	29,857
Feb.	10.01	8.90	7	1,820	23	1,060	1,500	86,539	191,018	995,901	33,790
Mar.	9.70	8.53	20	1,640	29	835	1,320	81,421	193,664	1,073,270	34,604
Apr.	10.79	8.65	18	2,800	1	908	1,560	92,608	180,241	843,010	33,687
May	11.20	8.00	31	2,730	5	509	1,250	77,107	190,421	863,860	45,872
June	9.67	8.55	28	1,520	6	768	1,130	67,182	194,076	902,876	33,856
July	9.98	8.79	1	1,720	7	888	1,280	78,551	225,728	1,632,595	34,413
Aug.	12.03	8.79	29	3,190	27	716	1,500	91,954	230,315	1,681,388	33,610
Sept.	11.40	8.55	6	2,860	13	764	1,500	89,308	203,070	1,353,719	43,182
Oct.	11.36	8.45	20	2,880	12	729	1,300	79,932	174,507	1,451,107	34,965
Nov.	10.77	8.79	26	2,390	! 8	921	1,340	79,914	176,831	1,047,471	34,832
Dec.	10.93	8.17	23	2,560	8	624	1,410	86,979	206,701	1,114,550	33,023
	12.03	8.00		3,190		509	1,390	1,009,439	2,419,172	10,592,467	513,755
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	3.67	2.44		90.3		14.4	39.4	1,245,123	2,984,000	13,065,596	633,707

! And other days

09-5211.01 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY AT YUMA, ARIZONA - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1988

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.66	9.64	9.31	8.82	9.32	9.04	9.78	9.44	9.64	9.57	8.92	9.89
2	9.66	9.62	9.32	9.19	9.04	8.98	9.71	9.26	10.33	9.04	9.59	9.88
3	9.75	9.54	9.42	9.61	8.67	8.86	9.63	9.39	10.58	9.54	9.51	9.87
4	9.81	9.60	9.52	9.88	8.30	8.70	9.63	9.40	9.60	9.83	9.09	9.66
5	9.65	9.57	9.42	9.95	8.40	8.68	9.45	9.45	10.03	9.43	9.50	8.70
6	9.66	9.75	9.46	9.71	8.42	8.60	9.09	9.96	11.17	9.37	9.03	8.67
7	9.69	9.96	9.41	9.30	8.31	8.69	8.89	9.96	10.33	9.04	9.11	8.45
8	9.85	9.96	9.42	9.43	8.38	8.65	9.02	9.88	9.30	10.16	8.94	8.25
9	9.95	9.91	9.39	9.45	8.83	8.58	9.36	9.64	9.29	8.87	8.85	8.48
10	10.02	9.89	9.02	9.56	8.94	8.57	9.56	9.46	9.45	8.85	9.13	8.40
11	9.89	9.65	8.97	9.53	8.64	8.61	9.50	9.16	9.24	8.62	9.36	8.54
12	9.72	9.57	9.10	9.39	8.44	8.62	9.37	8.93	8.90	8.49	9.32	9.11
13	9.66	9.63	9.16	9.67	8.50	8.82	9.14	9.78	8.90	8.61	9.09	9.64
14	9.75	9.69	9.16	9.63	8.46	9.18	9.07	9.53	9.70	9.69	9.21	9.67
15	9.81	9.60	9.08	9.79	8.75	9.09	9.07	9.34	9.84	9.47	9.84	9.36
16	9.61	9.56	8.96	10.31	9.93	9.23	9.18	10.13	9.34	8.76	9.21	9.37
17	9.66	9.48	8.92	10.45	9.98	9.27	9.31	9.53	9.42	8.94	9.09	9.64
18	9.68	9.58	9.17	10.40	9.83	9.37	9.27	9.67	9.16	9.30	9.20	9.43
19	9.66	9.53	9.40	9.85	9.65	9.52	9.29	10.00	9.69	9.24	9.18	9.47
20	9.69	9.42	9.68	9.73	9.73	9.45	9.22	10.00	9.78	10.84	9.23	9.54
21	9.70	9.36	9.61	9.60	9.62	9.42	9.21	10.02	9.54	10.71	9.58	9.76
22	9.72	9.24	9.59	9.64	9.76	9.26	9.23	9.95	9.69	10.30	9.40	10.21
23	9.62	9.03	9.51	9.66	9.86	9.25	9.37	10.04	9.51	8.86	9.37	10.64
24	9.89	9.13	9.09	9.70	9.77	9.36	9.81	10.71	10.19	9.00	9.51	10.18
25	9.85	9.47	8.97	10.11	9.88	9.46	9.77	11.01	9.49	9.55	9.82	9.81
26	9.88	9.52	8.93	9.97	9.88	9.53	9.71	10.54	9.63	9.52	10.44	9.67
27	9.72	9.38	9.29	9.59	9.86	9.41	9.59	9.16	9.57	9.79	10.26	10.18
28	9.35	9.50	9.20	9.61	9.89	9.48	9.00	9.27	9.67	8.89	9.57	9.75
29	9.43	9.48	8.98	9.53	9.89	9.37	8.94	11.39	9.34	9.16	9.65	9.61
30	9.50		8.96	9.35	10.33	9.34	9.10	10.50	9.33	8.91	9.97	9.48
31	9.64		8.76		10.30		9.59	9.88		8.82		9.52
Avg.	9.71	8.94	9.23	9.37	9.28	8.79	9.35	9.82	9.34	9.33	9.10	9.45

09-5302.00 YUMA MESA OUTLET DRAIN TO COLORADO RIVER NEAR YUMA, ARIZONA

DESCRIPTION: Venturi meter with recorder 0.3 mile (0.5 km) from outlet to Colorado River, 0.5 mile (0.8 km) west of Joe Henry Memorial Park in Yuma, Arizona. Outlet is 1.7 miles (2.7 km) downstream from the mouth of Yuma Main Canal Wasteway.
RECORDS: Records are furnished by U. S. Geological Survey. Monthly discharge July 1970 through 1988. Prior to July 21, 1972, records furnished by U. S. Bureau of Reclamation.
REMARKS: Records show water pumped from wells on the Yuma Mesa and conveyed by underground conduit to Colorado River.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	34	34	38	38	38	43	30	25	17	21	19	15
2	34	34	35	38	38	38	30	25	20	21	17	15
3	34	34	38	38	38	7.0	30	25	20	18	15	15
4	34	34	38	38	38	0	30	25	23	21	15	15
5	34	34	38	38	38	0	30	25	25	25	12	15
6	34	34	38	38	38	14	30	25	25	25	10	15
7	34	34	38	38	18	30	30	25	25	25	10	17
8	34	34	38	38	0	30	32	25	25	25	13	22
9	34	34	38	38	0	30	34	25	25	25	15	24
10	34	34	38	38	18	30	34	25	25	25	15	24
11	34	34	38	38	25	30	34	25	25	25	15	24
12	34	34	38	38	37	30	34	25	25	25	15	24
13	34	34	38	38	42	30	34	25	25	25	15	24
14	34	34	38	38	42	30	32	25	25	25	15	24
15	34	34	38	38	42	30	30	25	25	25	15	24
16	34	34	38	38	42	30	30	25	25	25	15	24
17	34	37	38	38	42	30	30	25	25	25	15	24
18	34	40	38	38	42	26	30	25	25	25	15	24
19	34	40	38	38	42	28	30	25	25	25	15	24
20	34	40	38	38	42	30	30	25	23	25	15	24
21	34	40	38	38	42	30	30	25	21	25	15	24
22	34	40	38	38	42	30	26	22	23	25	15	24
23	34	40	38	38	42	30	26	18	25	25	15	24
24	34	37	38	38	42	30	26	16	25	22	15	24
25	34	40	38	38	42	30	26	20	25	21	15	24
26	34	40	38	38	42	30	26	20	26	20	15	24
27	34	40	38	38	42	30	26	20	19	20	15	24
28	34	40	38	38	42	30	26	18	21	20	15	24
29	34	40	38	38	42	30	26	15	21	20	15	24
30	34		38	38	42	30	26	15	21	20	15	24
31	34		38		42		26	15		20		24
Sum	1,054	1,058	1,175	1,140	1,124	816.0	914	704	705	719	441	681

Current Year 1988								Period 1971-1988		
Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			! 1	34	! 1	34	34	2,091	2,380	5,840	0
Feb.			!18	40	! 1	34	36	2,099	2,273	4,830	0
Mar.			! 1	38	2	35	38	2,331	2,573	5,430	4.0
Apr.			! 1	38	! 1	38	38	2,261	2,481	5,120	242
May			!13	42	! 8	0	36	2,229	2,488	4,933	0
June			1	43	! 4	0	27	1,619	2,252	4,828	0
July			! 9	34	!22	26	29	1,813	2,539	5,510	692
Aug.			! 1	25	!29	15	23	1,396	2,726	6,000	180
Sept.			!26	26	1	17	24	1,398	2,710	5,880	0
Oct.			! 5	25	3	18	23	1,426	2,679	5,360	157
Nov.			1	19	! 6	10	15	875	2,703	5,290	313
Dec.			! 9	24	! 1	15	22	1,351	2,863	5,970	0
				43		0	29	20,889	30,667	58,680	1,753
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				1.22		0	0.82	25,766	37,827	72,381	2,162

ø Mean daily ! And other days

09-5305.00 DRAIN NO. 8-B (ARAZ DRAIN)

DESCRIPTION: This drain discharges into the Colorado River 4.0 miles (6.4 km) downstream from Colorado River below Yuma Main Canal Wasteway, and 2.5 miles (4.0 km) upstream from the northerly international boundary. Prior to October 1955, published as "Araz Drain."
RECORDS: Records are furnished by the U. S. Geological Survey from current meter measurements during the year. Records available: May 1948 through 1988.
REMARKS: Drain 8-B, which was constructed in February 1948, collects seepage water in the westerly section of the Reservation Division of the Yuma Project which lies in California. Flow in the drain between the mouth and the U. S. Highway No. 80 culvert, about 3,200 feet (975 m) upstream, is affected by backwater from the river during ordinary high stages.
EXTREMES: Mean daily discharge: Maximum, 24 second-feet (0.68 m3/sec) on September 1, 1953; minimum, 0.1 second-foot (0.003 m3/sec) several days in February 1966.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.9	6.6	7.1	8.1	5.4	5.7	4.8	6.4	9.0	8.7	8.6	7.1
2	7.9	6.5	7.2	8.0	5.4	5.7	4.8	6.4	9.0	8.6	8.6	7.0
3	7.9	6.5	7.4	8.0	5.5	5.7	4.9	6.4	9.0	8.5	8.6	6.9
4	7.9	6.4	7.3	7.9	5.5	5.7	5.0	6.4	8.9	8.4	8.4	6.8
5	7.9	6.3	7.2	7.9	5.6	5.7	5.0	6.5	8.9	8.3	8.2	6.6
6	7.9	6.3	7.1	7.8	5.6	5.7	5.1	6.7	8.9	8.2	8.1	6.5
7	7.9	6.3	7.1	7.8	5.7	5.6	5.1	6.8	8.8	8.1	7.9	6.4
8	7.8	6.2	7.0	7.7	5.7	5.6	5.2	6.9	8.7	8.0	7.8	6.4
9	7.8	6.2	6.9	7.6	5.8	5.6	5.2	7.1	8.6	7.9	7.6	6.3
10	7.7	6.2	6.8	7.6	5.8	5.5	5.3	7.2	8.4	7.8	7.6	6.3
11	7.7	6.2	6.8	7.5	5.8	5.4	5.3	7.4	8.3	7.7	7.6	6.2
12	7.6	6.1	6.7	7.5	5.8	5.3	5.4	7.5	8.2	7.8	7.6	6.2
13	7.6	6.1	6.6	7.4	5.8	5.2	5.5	7.6	8.1	7.8	7.5	6.2
14	7.5	6.1	6.5	7.3	5.8	5.1	5.6	7.8	8.0	7.9	7.5	6.1
15	7.5	6.1	6.5	7.3	5.8	5.0	5.8	7.9	8.1	7.9	7.5	6.1
16	7.4	6.0	6.4	7.2	5.8	4.9	5.9	8.0	8.1	8.0	7.5	6.0
17	7.4	6.0	6.5	7.2	5.8	4.9	6.0	8.2	8.2	8.0	7.5	6.0
18	7.3	6.0	6.6	7.1	5.8	4.8	6.2	8.2	8.2	8.1	7.5	5.9
19	7.3	6.1	6.8	6.9	5.8	4.7	6.3	8.3	8.3	8.1	7.5	5.9
20	7.2	6.1	6.9	6.7	5.8	4.6	6.4	8.3	8.4	8.2	7.5	5.8
21	7.2	6.2	7.0	6.6	5.8	4.5	6.4	8.3	8.4	8.2	7.4	5.8
22	7.1	6.2	7.1	6.4	5.8	4.4	6.4	8.4	8.5	8.3	7.4	5.8
23	7.0	6.3	7.3	6.2	5.8	4.3	6.4	8.4	8.5	8.3	7.4	5.8
24	7.0	6.3	7.4	6.0	5.7	4.4	6.4	8.4	8.6	8.4	7.4	5.8
25	6.9	6.4	7.5	5.8	5.7	4.5	6.4	8.5	8.7	8.4	7.3	5.8
26	6.9	6.6	7.6	5.6	5.7	4.5	6.4	8.5	8.7	8.5	7.3	5.8
27	6.8	6.7	7.7	5.5	5.7	4.6	6.4	8.5	8.8	8.6	7.3	5.8
28	6.8	6.8	7.9	5.3	5.7	4.6	6.4	8.6	8.8	8.6	7.2	5.8
29	6.7	7.0	8.0	5.3	5.7	4.7	6.4	8.6	8.9	8.6	7.2	5.8
30	6.7		8.1	5.3	5.7	4.7	6.4	8.6	9.0	8.6	7.1	5.8
31	6.6		8.1		5.7		6.4	8.7		8.6		5.8
Sum	228.8	182.8	221.1	208.5	177.0	151.6	179.2	239.5	257.0	255.1	229.6	190.5

Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
			Current Year 1988						**Period** 1948-1988		
Jan.			! 1	7.9	31	6.6	7.4	454	346	899	39.3
Feb.			29	7.0	!16	6.0	6.3	363	300	746	40.5
Mar.			!30	8.1	16	6.4	7.1	439	355	853	62.7
Apr.			1	8.1	!28	5.3	7.0	414	366	1,000	66.8
May			! 9	5.8	! 1	5.4	5.7	351	378	966	58.3
June			! 1	5.7	23	4.3	5.1	301	395	1,030	67.4
July			!20	6.4	! 1	4.8	5.8	355	454	1,260	72.8
Aug.			31	8.7	! 1	6.4	7.7	475	504	1,350	73.8
Sept.			! 1	9.0	14	8.0	8.6	510	492	1,370	53.6
Oct.			1	8.7	11	7.7	8.2	506	511	1,220	55.3
Nov.			! 1	8.6	30	7.1	7.7	455	457	1,240	57.7
Dec.			1	7.1	!20	5.8	6.1	378	405	1,050	42.2
				9.0		4.3	6.9	5,001	4,963	12,429	774
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				0.25		0.12	0.20	6,169	6,122	15,331	955

ø Mean daily ! And other days

09-5270.00 PILOT KNOB POWER PLANT AND WASTEWAY
NEAR PILOT KNOB, CALIFORNIA

DESCRIPTION: The Pilot Knob Power Plant and Wasteway is located on the All-American Canal, 20.8 miles (33.5 km) downstream from the intake at Imperial Dam, 6 miles (9.7 km) west of Yuma, about one mile (1.6 km) north of the northerly international boundary and empties into the old Alamo Canal in the United States and thence into the Colorado River through Rockwood gates, about one mile (1.6 km) upstream from the northerly international boundary. Water-stage recorder is located in forebay on right bank of the All-American Canal, 550 feet (168 m) upstream from wasteway gates and 1,800 feet (549 m) from entrance to the power plant. Datum of gage is 150.00 feet (45.72 m) above mean sea level. Tailrace gage is on left bank, 680 feet (207 m) downstream from power plant with automatic recording equipment in control house. All bypass gates are equipped with calibrated openings which are read on all gate changes. Datum of tailrace gage is at mean sea level; elevation of sill of wasteway gates is 147.88 feet (45.07 m), U. S. C. & G. S. datum. Prior to October 1956, this station was published as "Pilot Knob Wasteway near Pilot Knob, California."

RECORDS: Daily discharge is computed from flowmeter equipment and head and openings on wasteway gates or from head and gate opening on wicket and wasteway gates. Records furnished by the U. S. Geological Survey. Records available: July 1944 through 1988. The wasteway was operated for the purpose of diverting Colorado River water to the Alamo Canal for use in Mexico from July 1944 to November 8, 1950 in accordance with arrangements between the United States and Mexico for emergency use of the All-American Canal facilities. Records since 1950 show water released through Pilot Knob Power Plant and Wasteway from the All-American Canal and returned to the Colorado River through Rockwood gates.

REMARKS: Pilot Knob Wasteway was completed in 1938, and the first flow occurred on February 5, 1939. Pilot Knob Power Plant was completed in January 1957, and the first flow occurred on January 14, 1957.

EXTREMES: Maximum mean daily discharge, 9,930 second-feet (281 m3/sec) on October 6, 1985; minimum daily discharge, no flow during long periods.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,230	2,530	1,630	2,940	1,360	2,080	1,380	2,610	582	0	0	0
2	5,460	2,210	2,220	2,620	1,150	1,110	1,450	2,750	0	0	0	0
3	6,400	3,480	1,830	2,300	1,080	1,010	1,520	2,590	0	0	0	0
4	7,200	3,370	1,620	2,210	1,080	1,010	1,690	2,550	0	0	0	106
5	6,030	4,730	1,420	2,720	1,080	1,010	1,740	2,630	0	0	0	1,210
6	5,890	5,300	1,400	2,340	1,080	1,330	1,990	2,290	0	0	0	1,010
7	6,380	5,190	1,420	2,430	1,080	1,130	2,150	2,190	0	0	0	1,130
8	7,420	3,850	1,440	2,380	1,080	1,120	2,140	2,000	0	0	0	1,250
9	7,520	2,990	2,040	2,460	1,080	1,260	1,870	2,230	0	0	0	1,020
10	8,360	2,590	2,440	2,280	1,080	1,280	1,810	2,300	0	0	0	1,020
11	7,760	2,920	1,880	2,350	1,040	1,540	1,990	2,530	0	0	0	999
12	4,620	3,290	1,840	2,550	1,190	1,530	2,190	2,740	0	0	0	975
13	5,520	2,870	1,780	2,180	1,170	1,590	2,340	2,330	0	0	0	0
14	5,530	2,920	1,970	2,190	1,030	1,360	2,390	2,290	0	0	0	0
15	5,630	2,020	2,510	2,380	1,010	1,430	2,420	2,200	0	0	0	0
16	5,820	1,770	2,640	2,240	0	1,280	2,360	2,040	0	0	0	0
17	5,990	1,230	2,620	4,130	0	1,210	2,240	2,320	0	0	0	0
18	5,510	1,000	2,360	1,980	0	1,230	2,240	2,280	0	0	0	0
19	4,460	1,000	2,270	2,080	0	1,040	2,210	2,270	0	0	0	0
20	3,880	1,000	2,020	1,890	0	1,450	2,300	3,200	0	0	0	0
21	4,170	1,000	2,220	1,720	0	1,690	2,430	3,930	0	0	0	0
22	4,940	1,010	2,770	1,590	0	1,750	2,430	3,170	0	0	0	0
23	3,850	1,060	2,690	1,500	0	1,850	2,340	3,350	0	0	0	0
24	3,740	1,350	3,070	1,530	0	1,740	2,170	2,880	0	0	0	1,330
25	3,040	1,650	3,070	1,090	0	1,710	2,200	4,040	0	0	0	118
26	2,210	1,010	3,050	1,230	0	1,670	2,360	3,700	0	0	0	545
27	1,740	1,400	2,910	1,530	0	1,730	2,330	2,390	0	0	0	73
28	2,310	1,760	2,980	1,510	0	1,690	2,690	3,050	0	0	0	0
29	1,880	2,360	3,160	1,620	0	1,730	2,760	2,870	0	0	0	0
30	3,020		3,130	1,510	0	1,880	2,700	1,710	0	0	0	0
31	2,860		3,150		1,400		2,360	1,820		0		0
Sum	154,370	68,860	71,550	63,480	17,990	43,440	67,190	81,250	582	0	0	10,786

Current Year 1988									Period 1944-1988		
Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			10	8,360	27	1,740	4,980	306,188	92,349	521,792	0
Feb.			6	5,300	18	1,000	2,370	136,582	65,994	469,507	0
Mar.			29	3,160	6	1,400	2,310	141,917	119,850	406,929	0
Apr.			17	4,130	25	1,090	2,120	125,911	131,912	362,400	0
May			31	1,400	16	0	580	35,683	63,129	368,438	0
June			1	2,080	! 3	1,010	1,450	86,162	100,871	406,592	0
July			29	2,760	1	1,380	2,170	133,269	145,059	415,398	0
Aug.			25	4,040	30	1,710	2,620	161,157	148,314	404,370	0
Sept.			1	582	! 2	0	19	1,154	88,418	479,683	0
Oct.			! 1	0	! 1	0	0	0	63,411	500,429	0
Nov.			! 1	0	! 1	0	0	0	60,243	493,884	0
Dec.			24	1,330	! 1	0	348	21,394	95,491	568,225	0
				8,360		0	1,580	1,149,417	1,175,041	4,864,696	0
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				237		0	44.7	1,417,783	1,449,390	6,000,505	0

ø Mean daily ! And other days

09-5220.00 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank and cableway at the point where the northerly international land boundary (California-Baja California) intersects the Colorado River, about 6.4 miles (10.3 km) downstream from Colorado River below Yuma Main Canal Wasteway, 5 miles (8.0 km) west of Yuma, Arizona, 1.1 miles (1.8 km) upstream from Morelos Diversion Structure, and about one mile (1.6 km) downstream from Rockwood Gate. Zero of the gage is at mean sea level, U. S. C. & G. S. datum. On May 1, 1988, the gage was relocated 170 feet upstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is equal to that of the old gage. Station is operated by the United States Section of the Commission.

RECORDS: Based on 218 current meter measurements during the year,120 by the United States Section, 96 by the Mexican Section of the Commission, 2 by the U. S. Geological Survey, and a continuous record of gage heights. Discharges are computed on the basis of a water-stage recorder 1,680 feet (512 m) upstream from the northerly international boundary where the remains of an old weir serve as a partial controlling section. A continuous gage height record is available November 15, 1948 through 1988; daily discharge records available January 1, 1950 through 1988.

REMARKS: Reservoirs on the Colorado River, including Lake Mead above Hoover Dam, where storage began in 1935, reservoirs on the Gila River, and many irrigation diversions and return flows regulate the river flow at this station except for infrequent flood flows. During 1988 the flow at this point represented the total amount of the Colorado River water which crossed the northerly international boundary.

EXTREMES: Prior to January 1935: Maximum instantaneous discharge estimated about 250,000 second-feet, (7,080 m3/sec), January 22, 1916; minimum discharge, no flow several days during August and September 1934; average annual flow 13,443,000 acre-feet (16,581,806,000 m3); maximum annual flow 25,480,000 acre-feet (31,429,325,000 m3), 1907; minimum annual flow 1,174,000 acre-feet (1,448,117,000 m3), 1934. Since January 1935: Maximum instantaneous discharge 40,600 second-feet (1,150 m3/sec) on August 20, 1983, minimum discharge, no flow during April 1935.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,700	4,470	3,130	3,860	2,700	3,390	2,930	3,960	2,280	1,700	1,050	1,960
2	6,900	3,440	3,410	3,970	2,430	2,210	2,950	4,020	2,090	1,190	1,580	1,940
3	7,780	5,040	3,360	3,840	2,040	1,980	2,950	3,950	2,160	1,540	1,630	1,880
4	8,730	4,940	3,260	3,910	1,800	1,890	3,070	3,940	1,680	1,820	1,260	1,870
5	7,510	6,240	3,020	4,540	1,710	1,870	3,040	3,950	1,760	1,560	1,510	2,100
6	7,220	6,990	2,980	4,050	1,880	2,030	3,060	4,030	2,550	1,510	1,230	2,050
7	7,700	7,160	2,930	3,710	1,860	2,020	3,070	3,930	2,280	1,170	1,260	1,990
8	8,920	5,780	2,980	3,850	1,840	2,000	3,170	3,700	1,600	1,830	1,120	1,910
9	9,100	5,050	3,470	3,820	2,080	2,020	3,100	3,700	1,500	1,160	1,040	1,940
10	10,300	4,620	3,770	3,820	2,270	2,030	3,170	3,710	1,560	1,090	1,260	1,910
11	9,740	4,720	3,000	3,890	1,940	2,330	3,390	3,700	1,490	926	1,460	1,940
12	6,370	5,000	3,200	3,900	1,990	2,320	3,460	3,750	1,370	798	1,340	2,270
13	6,950	4,650	3,030	3,780	2,010	2,520	3,480	3,920	1,310	838	1,140	1,810
14	7,040	4,470	3,250	3,750	1,830	2,570	3,460	3,840	1,630	1,550	1,170	1,820
15	7,140	3,590	3,770	3,950	1,910	2,550	3,450	3,610	1,900	1,580	1,680	1,580
16	7,170	3,320	3,650	4,550	1,780	2,550	3,470	3,890	1,530	1,000	1,310	1,540
17	7,350	2,930	3,660	6,140	1,910	2,520	3,450	3,860	1,540	1,060	1,160	1,750
18	6,990	2,590	3,610	4,080	1,800	2,550	3,480	3,880	1,390	1,440	1,330	1,540
19	6,120	2,600	3,840	3,820	1,680	2,510	3,460	4,020	1,680	1,270	1,310	1,590
20	5,530	2,550	3,720	3,400	1,660	2,860	3,450	4,960	1,770	2,130	1,310	1,680
21	5,750	2,480	3,660	3,220	1,570	3,010	3,570	5,660	1,610	2,220	1,610	1,780
22	6,590	2,430	4,380	3,140	1,630	3,000	3,580	4,920	1,710	2,020	1,490	2,150
23	5,460	2,260	4,250	3,070	1,820	3,040	3,580	5,100	1,560	1,020	1,420	2,340
24	5,580	2,700	4,330	3,090	1,760	3,050	3,730	4,970	2,090	1,150	1,510	3,480
25	4,840	3,150	4,240	3,100	1,770	3,030	3,730	6,610	1,650	1,560	1,730	1,970
26	4,280	2,690	4,210	3,070	1,810	3,020	3,850	5,950	1,670	1,510	2,160	2,160
27	3,670	2,930	4,200	3,060	1,740	3,040	3,790	3,610	1,550	1,760	2,120	2,210
28	3,790	3,360	4,240	3,050	1,770	3,040	3,730	3,960	1,640	1,020	1,690	1,890
29	3,280	4,170	4,300	3,090	1,780	3,020	3,760	5,550	1,530	1,330	1,610	1,780
30	4,330		4,170	2,930	1,980	3,080	3,810	4,040	1,430	1,080	1,820	1,690
31	4,610		4,230		3,510		3,830	3,440		1,010		1,710
Sum	203,440	116,320	113,250	111,450	60,260	77,050	106,020	132,130	51,510	42,842	43,310	60,230

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1935-1988 Acre-Feet Average	Acre-Feet Maximum	Acre-Feet Minimum
Jan.	106.90	103.98	!10	11,100	29	3,020	6,560	403,517	443,085	1,644,000	31,900
Feb.	105.55	103.73	7	7,260	22	2,140	4,010	230,717	364,255	1,382,678	60,400
Mar.	106.26	104.32	22	4,380	2	2,650	3,650	224,628	377,385	1,259,702	19,400
Apr.	106.68	104.46	17	6,350	21	2,670	3,720	221,058	312,776	1,072,264	0
May	104.45	102.71	31	4,580	!21	1,430	1,940	119,524	310,497	1,151,000	71,405
June	104.79	103.17	1	4,400	! 5	1,840	2,570	152,826	314,048	1,321,388	8,500
July	105.42	104.33	26	3,920	1	2,770	3,420	210,287	333,998	1,867,835	24,400
Aug.	106.52	104.01	21	7,040	18	3,440	4,260	262,076	347,247	2,015,207	43,800
Sept.	104.77	102.23	1	3,270	!12	1,260	1,720	102,169	304,047	1,853,355	53,851
Oct.	103.56	102.03	20	2,450	12	773	1,380	84,976	299,325	1,960,066	42,956
Nov.	103.65	102.10	26	2,360	16	949	1,440	85,904	331,764	1,532,231	41,403
Dec.	104.67	102.59	24	4,890	15	1,470	1,940	119,464	419,469	1,832,000	42,000
Yearly	106.90	102.03		11,100		773	3,050	2,217,146	4,157,896	15,430,412	722,100
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	32.58	31.10		314		21.9	86.4	2,734,805	5,128,682	19,033,104	890,696

! And other days

09-5220.01 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1988

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	104.44	104.78	104.66	105.68	104.37	103.95	104.48	105.44	103.70	102.93	102.24	103.19
2	104.58	104.81	104.98	105.61	104.02	103.66	104.50	105.49	103.50	102.33	102.74	103.13
3	105.18	104.82	104.90	105.60	103.52	103.36	104.50	105.44	103.59	102.67	102.79	103.00
4	105.79	104.83	104.76	105.66	103.18	103.24	104.62	105.43	102.94	103.09	102.37	102.98
5	105.00	104.96	104.51	106.12	103.15	103.22	104.60	105.41	103.02	102.81	102.64	103.26
6	104.76	105.03	104.51	105.74	103.31	103.44	104.62	105.50	104.07	102.73	102.38	103.30
7	105.05	105.02	104.45	105.51	103.30	103.43	104.62	105.41	103.83	102.33	102.37	103.20
8	105.83	104.86	104.47	105.52	103.23	103.41	104.71	105.22	102.79	102.88	102.27	103.09
9	105.91	104.73	104.91	105.54	103.66	103.44	104.64	105.20	102.58	102.35	102.20	103.15
10	106.47	104.78	104.93	105.51	103.78	103.45	104.70	105.21	102.69	102.26	102.37	103.12
11	106.22	104.82	104.62	105.55	103.51	103.85	104.94	105.20	102.58	102.15	102.58	103.15
12	104.32	105.08	104.64	105.60	103.52	103.84	105.00	105.25	102.41	102.05	102.56	103.55
13	104.54	105.10	104.62	105.52	103.48	104.05	105.02	105.41	102.34	102.08	102.38	103.08
14	104.56	105.22	104.80	105.47	103.22	104.10	104.99	105.36	102.79	102.53	102.40	103.07
15	104.61	105.18	105.20	105.67	103.20	104.10	104.97	105.13	103.30	102.68	102.95	102.78
16	104.64	104.97	105.18	105.79	103.28	104.13	104.99	105.39	102.67	102.20	102.61	102.63
17	104.77	104.49	105.25	106.57	103.28	104.10	104.97	105.36	102.67	102.22	102.35	102.96
18	104.62	104.12	105.31	105.86	103.16	104.12	105.00	105.37	102.45	102.54	102.44	102.71
19	104.44	104.15	105.36	105.48	102.94	104.09	104.98	105.48	102.91	102.39	102.41	102.70
20	104.48	104.14	105.34	105.23	102.90	104.44	104.97	105.65	103.05	103.15	102.41	102.83
21	104.54	104.04	105.51	104.91	102.82	104.58	105.08	105.84	102.77	103.36	102.77	102.97
22	104.72	104.05	105.97	104.76	102.85	104.58	105.09	105.49	102.91	103.13	102.63	103.44
23	104.72	103.81	105.96	104.69	103.03	104.61	105.09	105.37	102.68	102.20	102.53	103.66
24	104.76	104.05	105.99	104.70	103.06	104.61	105.24	105.17	103.52	102.29	102.60	103.93
25	104.68	104.62	105.96	104.71	103.07	104.60	105.26	105.35	102.87	102.66	102.86	103.25
26	104.65	104.21	105.94	104.71	103.14	104.57	105.36	105.05	102.91	102.63	103.41	103.45
27	104.59	104.42	105.97	104.70	103.01	104.58	105.31	104.59	102.66	102.93	103.36	103.44
28	104.59	104.79	105.95	104.70	103.05	104.58	105.25	104.50	102.85	102.21	102.88	103.09
29	104.60	104.92	106.01	104.73	103.07	104.57	105.28	104.69	102.72	102.50	102.71	102.98
30	104.77		106.01	104.63	103.33	104.62	105.32	104.47	102.46	102.25	102.95	102.88
31	104.74		105.93		103.91		105.34	104.67		102.20		102.89
Avg.	104.89	104.65	105.25	105.35	103.30	104.04	104.95	105.24	102.94	102.54	102.61	103.12

09-5318.50 COOPER WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging regulatory waste water from the Cooper Canal to the Colorado River. This wasteway is located 0.5 mile (0.8 km) downstream from the northerly international boundary and 0.6 mile (1.0 km) upstream from Morelos Diversion Dam. Prior to July 14, 1971, the wasteway was located 0.4 mile (0.6 km) downstream from Morelos Diversion Dam. This wasteway discharges waste water from the Valley Division of the Yuma Project in the United States into the Colorado River. Since July 14, 1971, zero of the gage is 117.64 feet (35.86 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge March 1950 through 1988 obtained by the United States Section; monthly discharge, January 1934 through 1950 by the Bureau of Reclamation.

EXTREMES: Prior to March 1950, maximum monthly discharge 914 acre-feet (1,127,000 m3) in January 1940; minimum monthly discharge, zero for various months. Since March 1950, maximum instantaneous discharge, 79.3 second-feet (2.25 m3/sec) on June 19, 1965, at a maximum gage height of 114.13 feet (34.79 m) (old datum); minimum instantaneous discharge, zero during parts of most months.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	1.2	1.5	0.7	0	0.6	0	0	0	0	0.7	0
2	5.3	.8	4.8	2.6	0	1.6	0	0	0	.2	2.0	5.1
3	5.5	3.2	0	.1	0	.6	0	2.8	0	.4	6.6	4.1
4	1.8	5.5	0	0	0	1.3	0	2.9	0	1.5	.1	2.0
5	6.5	.1	3.5	0	0	.5	0	2.8	1.0	4.0	.6	.2
6	.1	1.4	3.6	0	1.7	1.1	1.5	0	1.6	2.3	6.8	0
7	3.5	.4	0	0	1.3	2.1	0	0	.1	2.3	.1	0
8	.8	0	0	0	.4	0	6.0	0	0	.5	0	0
9	6.9	1.1	0	0	0	.2	.5	0	0	8.4	0	12.6
10	3.3	4.8	0	0	0	0	.5	0	.3	0	.9	13.4
11	1.9	1.5	4.0	.6	0	0	.4	.1	.1	2.9	2.8	4.0
12	.8	0	3.1	.1	0	0	0	2.1	1.2	0	.6	12.0
13	2.6	0	.4	0	2.3	1.1	0	3.6	.6	.8	2.0	1.7
14	2.6	5.8	3.7	.3	2.6	6.7	0	0	4.8	0	5.6	2.4
15	.6	4.1	4.9	7.6	2.2	.3	0	0	1.8	0	13.4	3.7
16	4.1	0	0	.1	0	0	0	6.1	.1	0	5.6	0
17	6.3	0	2.5	0	0	.9	6.1	0	.2	0	4.6	1.5
18	0	0	6.5	0	0	2.1	2.2	0	0	0	7.8	.1
19	0	8.1	.9	.5	0	.1	4.9	0	0	.7	7.5	7.8
20	1.6	0	1.8	5.8	0	.1	.1	0	2.1	0	.8	.1
21	7.1	1.0	.2	2.0	0	2.6	5.8	1.0	.6	2.7	1.8	10.6
22	4.0	0	0	.1	0	4.4	2.1	2.5	0	.3	.8	3.8
23	4.6	0	0	0	0	2.0	1.2	0	0	.9	1.1	.8
24	2.1	4.3	0	0	3.1	0	.1	2.5	1.7	.6	.9	1.3
25	0	.6	5.9	0	3.2	0	0	.8	1.1	0	.8	3.3
26	0	.1	.4	2.0	.2	2.2	0	.5	.1	0	.1	3.4
27	0	.1	0	1.5	.1	.4	0	0	0	1.3	3.6	4.0
28	0	0	0	2.3	.1	1.5	0	2.3	2.1	0	2.8	1.8
29	3.2	0	0	1.3	.1	0	2.1	1.5	3.5	0	.6	2.9
30	.2		0	0	.3	0	4.3	.1	.4	0	0	7.6
31	4.7		0		.1		0	0		0		4.2
Sum	83.0	44.1	47.7	27.6	17.7	32.4	37.8	31.6	23.4	29.8	81.0	114.4

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1935-1988 Acre-Feet Average	Maximum	Minimum
Jan.	1.70	0	5	31.5	! 4	0	2.7	165	154	914	0
Feb.	1.87	0	14	36.4	! 1	0	1.5	87.5	134	400	6.0
Mar.	2.06	0	14	42.2	! 1	0	1.5	94.6	144	517	0
Apr.	1.67	0	15	30.7	! 1	0	.9	54.7	147	425	16.7
May	1.35	0	6	22.3	! 1	0	.6	35.1	146	440	31.7
June	1.48	0	26	25.6	! 1	0	1.1	64.3	134	595	22.6
July	1.86	0	17	36.1	! 1	0	1.2	75.0	128	516	0
Aug.	1.47	0	16	25.3	! 1	0	1.0	62.7	98.5	617	0
Sept.	1.92	0	17	37.9	! 1	0	.8	46.4	102	462	0
Oct.	2.13	0	9	44.4	! 1	0	1.0	59.1	128	490	0
Nov.	2.57	0	17	59.0	! 1	0	2.7	161	147	462	9.0
Dec.	2.73	0	! 9	64.6	! 1	0	3.7	227	166	592	13.7
Yearly	2.73	0		64.6		0	1.6	1,132	1,629	4,500	638
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.83	0		1.83		0	0.05	1,396	2,009	5,551	787

! And other days

09-5220.21 COLORADO RIVER IMMEDIATELY ABOVE MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico attached to the upstream abutment of the gates of the Intake Canal at Morelos Dam, 1.1 miles (1.8 km) downstream from the northerly international boundary, and about 7.5 miles (12.1 km) downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.16 foot (0.05 m) below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage height records November 8, 1950 to June 3, 1951; a continuous record of gage heights June 4, 1951 through 1988.

REMARKS: Prior to June 4, 1951, when a continuous water-stage recorder was installed, mean daily gage height records were determined from hourly readings of a staff gage.

EXTREMES: Since November 8, 1950: Maximum mean daily elevation above mean sea level, 114.44 feet (34.88 m) on August 18, 1983; minimum mean daily elevation above mean sea level, 101.51 feet (30.94 m) on February 17, 1957.

MEAN DAILY GAGE HEIGHT IN FEET 1988

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	103.41	104.40	104.36	105.31	104.10	103.58	104.23	105.15	103.48	102.72	102.13	102.85
2	103.54	104.49	104.63	105.25	103.71	103.38	104.27	105.18	103.28	102.17	102.59	102.76
3	104.10	104.40	104.59	105.22	103.22	103.12	104.23	105.15	103.38	102.43	102.62	102.62
4	104.76	104.43	104.46	105.31	102.92	102.99	104.36	105.12	102.72	102.85	102.23	102.59
5	104.00	104.40	104.23	105.71	102.92	102.99	104.33	105.12	102.79	102.59	102.53	102.89
6	103.74	104.33	104.20	105.38	103.08	103.22	104.36	105.22	103.84	102.49	102.26	102.99
7	104.04	104.36	104.17	105.15	103.05	103.18	104.36	105.12	103.64	102.13	102.26	102.95
8	104.79	104.33	104.20	105.15	102.99	103.18	104.46	104.92	102.62	102.59	102.17	102.85
9	104.89	104.43	104.56	105.18	103.41	103.18	104.40	104.92	102.36	102.17	102.13	102.92
10	105.45	104.43	104.59	105.15	103.51	103.22	104.43	104.92	102.46	102.07	102.26	102.85
11	105.25	104.69	104.30	105.18	103.22	103.58	104.69	104.92	102.36	101.97	102.46	102.89
12	103.48	104.76	104.33	105.25	103.18	103.58	104.76	104.95	102.23	101.90	102.46	103.28
13	103.51	104.89	104.30	105.18	103.12	103.77	104.76	105.12	102.17	101.94	102.30	102.85
14	103.48	104.92	104.46	105.12	102.85	103.84	104.72	105.05	102.59	102.33	102.30	102.82
15	103.44	104.92	104.86	105.35	102.92	103.84	104.72	104.86	103.08	102.49	102.82	102.53
16	103.51	104.33	104.82	105.48	102.99	103.84	104.72	105.12	102.46	102.03	102.53	102.36
17	103.64	103.90	104.92	106.10	102.99	103.81	104.69	105.09	102.46	102.07	102.26	102.69
18	103.54	103.90	104.99	105.54	102.85	103.84	104.76	105.09	102.26	102.36	102.33	102.43
19	103.67	103.84	105.02	105.15	102.62	103.81	104.72	105.18	102.66	102.23	102.07	102.43
20	103.87	103.84	104.99	104.92	102.59	104.17	104.72	105.31	102.82	102.92	102.07	102.53
21	103.94	103.74	101.87	104.59	102.53	104.30	104.82	105.38	102.59	103.15	102.40	102.72
22	104.04	103.51	105.61	104.46	102.53	104.33	104.82	105.12	102.69	102.95	102.30	103.15
23	104.20	103.81	105.61	104.36	102.56	104.33	104.82	105.09	102.49	102.07	102.17	103.38
24	104.23	104.30	105.64	104.40	102.72	104.33	104.99	104.86	103.31	102.17	102.23	103.54
25	104.23	104.30	105.61	104.40	102.76	104.33	104.99	104.86	102.69	102.49	102.49	102.99
26	104.30	104.13	105.61	104.40	102.85	104.30	105.09	104.59	102.69	102.46	103.02	103.18
27	104.27	104.49	105.61	104.40	102.72	104.33	105.05	104.36	102.46	102.76	103.02	103.18
28	104.27	104.49	105.64	104.40	102.76	104.33	104.99	104.20	102.66	102.10	102.56	102.82
29	104.33	104.56	105.68	104.43	102.76	104.33	105.02	104.27	102.56	102.33	102.36	102.72
30	104.36		105.64	104.33	103.08	104.36	105.05	104.23	102.26	102.13	102.62	102.62
31	104.33		105.58		103.54		105.05	104.43		102.10		102.62
Avg.	104.08	104.32	104.81	105.01	103.00	103.78	104.69	104.93	102.74	102.36	102.40	102.84

09-5220.30 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - DISCHARGES

DESCRIPTION: Water-stage recorder and staff gage on left bank of Intake Canal, 200 feet (61.0 m) downstream from the intake at Morelos Dam, 1,350 feet (410 m) upstream from the point where it joins the old Alamo Canal, 2.2 miles (3.5 km) upstream from Matamoros Check, and about one mile (1.6 km) south of the northerly international boundary. The zero of the gage is 0 6 foot (0.05 m) below mean sea level, U. S. C. & G. S. datum.

RECORDS: The records are deduced from the flows arriving in the limitrophe section of the Colorado River at the northerly international boundary, the flows that pass downstream from the structure, and leakage through the structure. Records available: November 8, 1950 through 1988. Records obtained and furnished by the Mexican Section of the Commission.

REMARKS: The canal is operated with a minimum hydraulic slope to permit the maximum retention of silt above Matamoros Check, and the lower velocities in the canal do not permit measuring the flow with a current meter. Records for this station show the amounts of Colorado River water diverted at Morelos Diversion Dam to the Intake Canal and thence to the Alamo Canal for use in Mexico. Under conditions set forth in the 1944 Water Treaty, water for use in Mexico may be diverted to the Alamo Canal in the United States directly from the river at Rockwood Heading or by means of Imperial Dam, the All-American Canal, and certain facilities of the Imperial Irrigation District. No diversions of this nature have been made during the years 1951 through 1988, and consequently the records reported below show the total water diverted from the Colorado River to the Alamo Canal during those years. Mexico occasionally pumps water from the Colorado River at other points below Morelos Dam when water is available in the channel.

EXTREMES: Maximum mean daily discharge, 6,600 second-feet (187 m3/sec), July 12 and 14, 1983; maximum mean daily gage height, 107.32 (32.71 m) March 30 and 31, 1985, and March 1, 1986. Minimum daily discharge, no flow on various occasions.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,820	3,380	3,140	3,960	2,700	2,550	2,930	3,960	2,280	1,700	1,050	1,960
2	1,930	3,460	3,350	3,880	2,430	2,210	2,950	4,030	2,090	1,190	1,580	1,950
3	2,010	3,410	3,320	3,850	2,040	1,980	2,950	3,960	2,160	1,540	1,640	1,890
4	2,010	3,440	3,250	3,920	1,800	1,890	3,070	3,960	1,680	1,820	1,260	1,870
5	1,990	3,430	3,090	4,240	1,710	1,870	3,040	3,960	1,760	1,560	1,510	2,100
6	2,000	3,440	3,090	3,920	1,880	2,030	3,060	4,030	2,550	1,510	1,240	2,050
7	2,020	3,400	3,050	3,740	1,860	2,020	3,070	3,920	2,280	1,170	1,260	1,990
8	2,070	3,370	3,060	3,740	1,840	2,000	3,170	3,710	1,600	1,780	1,120	1,910
9	2,150	3,320	3,400	3,780	2,080	2,020	3,100	3,710	1,500	1,170	1,040	1,950
10	2,190	3,390	3,400	3,780	2,270	2,030	3,170	3,710	1,560	1,090	1,260	1,920
11	2,170	3,450	3,180	3,810	1,940	2,330	3,390	3,710	1,490	929	1,460	1,950
12	2,160	3,640	3,170	3,880	1,990	2,320	3,460	3,740	1,370	798	1,340	2,280
13	2,210	3,710	3,160	3,810	2,010	2,520	3,480	3,920	1,310	840	1,140	1,810
14	2,170	3,780	3,310	3,740	1,830	2,580	3,460	3,850	1,640	1,520	1,180	1,820
15	2,170	3,740	3,640	3,850	1,910	2,550	3,450	3,600	1,900	1,580	1,690	1,590
16	2,160	3,600	3,640	3,990	1,780	2,550	3,470	3,880	1,530	999	1,320	1,540
17	2,160	3,210	3,670	4,560	1,910	2,520	3,460	3,850	1,540	1,060	1,170	1,750
18	2,260	2,890	3,740	4,060	1,800	2,550	3,480	3,880	1,390	1,440	1,340	1,540
19	2,490	2,870	3,780	3,780	1,690	2,510	3,460	4,030	1,680	1,270	1,320	1,600
20	2,670	2,810	3,780	3,640	1,660	2,860	3,450	4,060	1,770	2,110	1,310	1,680
21	2,780	2,630	3,850	3,300	1,570	3,010	3,570	4,340	1,610	2,220	1,610	1,790
22	3,000	2,620	4,200	3,150	1,630	3,010	3,570	4,100	1,710	2,020	1,490	2,150
23	3,210	2,400	4,240	3,080	1,820	3,040	3,570	3,990	1,560	1,020	1,420	2,340
24	3,270	2,590	4,270	3,120	1,760	3,050	3,740	3,810	2,090	1,150	1,510	3,400
25	3,260	3,050	4,240	3,180	1,770	3,030	3,740	3,780	1,650	1,560	1,730	1,970
26	3,310	2,760	4,240	3,190	1,810	3,020	3,850	3,600	1,670	1,510	2,160	2,160
27	3,280	2,920	4,240	3,180	1,740	3,040	3,780	3,430	1,550	1,760	2,130	2,210
28	3,290	3,210	4,240	3,190	1,770	3,040	3,740	3,170	1,640	1,020	1,690	1,890
29	3,330	3,310	4,270	3,130	1,780	3,020	3,780	3,200	1,530	1,330	1,610	1,780
30	3,380		4,310	3,010	1,980	3,080	3,810	3,160	1,430	1,080	1,820	1,700
31	3,340		4,170		2,520		3,810	3,320		1,010		1,710
Sum	78,260	93,230	113,490	109,460	59,280	76,230	106,030	117,370	51,520	42,756	43,400	60,250

Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1950-1988 Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	104.53	102.69	30	3,380	1	1,820	2,520	155,220	88,393	223,193	966
Feb.	104.95	103.25	14	3,780	23	2,400	3,210	184,878	86,508	203,958	9,232
Mar.	105.74	103.87	30	4,310	7	3,050	3,660	225,063	188,995	352,959	97,902
Apr.	106.04	104.07	17	4,560	30	3,010	3,650	217,148	213,060	328,093	153,792
May	104.07	102.10	1	2,700	21	1,570	1,910	117,628	112,547	232,004	66,207
June	104.30	102.72	30	3,080	5	1,870	2,540	151,235	163,120	269,632	95,177
July	104.92	103.84	26	3,850	1	2,930	3,420	210,346	226,947	356,040	125,745
Aug.	105.84	103.58	21	4,340	30	3,160	3,790	232,774	224,676	341,044	130,298
Sept.	104.23	101.15	6	2,550	13	1,310	1,720	102,231	134,419	273,177	53,633
Oct.	102.92	100.49	21	2,220	12	798	1,380	84,867	71,797	227,661	10,453
Nov.	103.25	101.28	26	2,160	9	1,040	1,450	86,079	60,793	209,478	7,516
Dec.	103.94	101.97	24	3,400	116	1,540	1,940	119,568	90,970	200,974	8,825
Yearly	106.04	100.49		4,560		798	2,600	1,887,035	1,665,152	2,798,192	1,272,332
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	32.32	30.63		129		22.6	73.6	2,327,633	2,053,943	3,451,533	1,569,404

ø Mean daily ! And other days

09-5220.31 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1988

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	102.76	104.23	104.20	105.18	103.94	103.58	104.00	104.92	103.18	102.40	101.31	102.79
2	102.82	104.30	104.49	105.12	103.58	103.38	104.00	104.95	103.02	101.51	102.13	102.72
3	102.92	104.17	104.43	105.09	103.05	103.12	104.00	104.92	103.05	101.94	102.30	102.49
4	102.92	104.20	104.30	105.25	102.72	102.99	104.13	104.89	102.40	102.62	101.64	102.46
5	102.89	104.20	104.07	106.54	102.66	102.99	104.10	104.89	102.43	102.36	102.00	102.79
6	102.92	104.17	104.04	105.25	102.85	103.22	104.10	104.95	103.41	102.23	101.74	102.92
7	102.95	104.13	104.00	105.02	102.82	103.18	104.10	104.89	102.26	101.44	101.67	102.79
8	102.95	104.17	104.00	105.02	102.76	103.18	104.20	104.69	101.87	102.03	101.48	102.69
9	103.05	104.13	104.43	105.05	103.22	103.18	104.17	104.66	102.00	101.38	101.38	102.76
10	103.15	104.20	104.43	105.02	103.31	103.22	104.23	104.69	102.00	101.02	101.61	102.69
11	103.12	104.23	104.17	105.05	103.05	103.58	104.49	104.69	101.90	100.75	101.94	102.72
12	103.08	104.49	104.17	105.12	102.99	103.58	104.56	104.72	101.67	100.56	101.97	102.82
13	103.18	104.56	104.13	105.02	102.92	103.77	104.56	104.86	101.28	100.59	101.71	102.69
14	103.08	104.69	104.30	104.95	102.69	103.84	104.53	104.82	102.07	101.28	101.71	102.62
15	103.12	104.72	104.66	105.15	102.72	103.84	104.46	104.63	102.82	101.61	102.43	102.33
16	103.08	104.53	104.69	105.28	102.85	103.84	104.49	104.86	102.00	100.79	102.10	102.03
17	103.12	104.07	104.76	105.94	102.85	103.81	104.46	104.82	101.97	100.82	101.54	102.46
18	103.22	103.67	104.82	105.38	102.76	103.84	104.53	104.82	101.51	101.44	101.67	102.20
19	103.44	103.67	104.86	105.02	102.46	103.81	104.49	104.92	102.20	101.12	101.71	102.10
20	103.67	103.67	104.82	104.79	102.36	104.17	104.49	105.02	102.53	102.33	101.71	102.30
21	103.77	103.58	104.99	104.46	102.23	104.30	104.59	105.15	102.17	102.76	102.23	102.46
22	103.87	103.58	105.41	104.30	102.26	104.33	104.59	104.89	102.33	102.53	102.17	103.02
23	104.04	103.31	105.45	104.23	102.49	104.33	104.59	104.86	102.03	101.12	101.84	103.18
24	104.07	103.51	105.48	104.23	102.56	104.33	104.76	104.66	103.05	101.25	101.87	103.41
25	104.07	104.10	105.45	104.23	102.53	104.33	104.76	104.63	102.36	101.94	102.26	102.82
26	104.10	103.74	105.45	104.27	102.66	104.30	104.86	104.40	102.40	102.00	102.95	103.02
27	104.10	103.94	105.45	104.23	102.49	104.33	104.82	104.10	101.94	102.36	102.95	103.05
28	104.10	104.30	105.45	104.27	102.49	104.33	104.72	103.94	102.33	101.21	102.46	102.69
29	104.17	104.40	105.51	104.27	102.56	104.33	104.79	103.97	102.20	101.80	102.17	102.56
30	104.23		105.51	104.20	102.82	104.36	104.82	103.94	101.64	101.41	102.46	102.46
31	104.20		105.45		103.35		104.82	104.13		101.25		102.46
Avg.	103.42	104.09	104.75	104.86	102.81	103.78	104.46	104.69	102.27	101.61	101.97	102.66

09-5220.41 COLORADO RIVER IMMEDIATELY BELOW MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico immediately downstream from Morelos Dam, 1.1 miles (1.8 km) downstream from the northerly international boundary, and about 7.5 miles (12.1 km) downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.16 foot (0.05 m) below mean sea level.
RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage heights, February 20, 1951 to June 6, 1966; continuous record of gage heights June 7, 1966 through 1988.
REMARKS: On June 7, 1966 a continuous water-stage recorder was installed; prior to this date, mean daily gage heights were determined from hourly readings of staff gage.
EXTREMES: Maximum mean daily gage height, 113.98 feet (34.74 m) on August 18, 1983; minimum mean gage height, 97.24 feet (29.64 m) on several days during October 1988.

MEAN DAILY GAGE HEIGHT IN FEET 1988

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	103.35	100.43	98.16	98.43	97.60	99.25	97.44	97.41	97.87	97.28	97.38	97.31
2	103.44	99.74	98.23	98.43	97.57	97.57	97.44	97.41	97.74	97.28	97.38	97.34
3	104.04	101.38	98.00	98.39	97.54	97.54	97.44	97.41	97.70	97.28	97.41	97.31
4	104.66	101.21	97.93	98.39	97.54	97.51	97.41	97.41	97.64	97.28	97.54	97.31
5	103.90	102.46	97.90	98.79	97.51	97.47	97.41	97.41	97.60	97.28	97.47	97.31
6	103.64	103.05	97.87	98.65	97.51	97.47	97.41	97.41	97.64	97.28	97.41	97.31
7	103.90	103.08	97.87	98.39	97.51	97.47	97.41	97.41	97.64	97.28	97.41	97.31
8	104.69	101.90	97.83	98.39	97.47	97.47	97.41	97.44	97.57	98.06	97.38	97.28
9	104.76	101.15	98.26	98.36	97.51	97.47	97.41	97.44	97.57	97.28	97.38	97.28
10	105.35	100.62	98.62	98.36	97.51	97.44	97.41	97.44	97.57	97.24	97.38	97.31
11	105.09	100.69	97.83	98.39	97.51	97.44	97.44	97.41	97.57	97.24	97.38	97.31
12	102.72	100.72	97.80	98.36	97.51	97.47	97.44	97.41	97.57	97.24	97.38	97.31
13	103.18	100.33	97.77	98.36	97.51	97.47	97.44	97.41	97.57	97.28	97.38	97.31
14	103.38	100.30	97.77	98.39	97.51	97.47	97.44	97.41	97.57	98.16	97.34	97.34
15	103.38	98.98	97.80	98.43	97.47	97.47	97.44	97.41	97.60	97.38	97.38	97.31
16	103.41	98.49	97.93	98.65	97.47	97.47	97.44	97.44	97.57	97.31	97.38	97.31
17	103.54	98.23	97.74	100.66	97.44	97.47	97.41	97.44	97.57	97.28	97.34	97.31
18	103.08	98.00	97.74	98.75	97.44	97.47	97.41	97.41	97.54	97.31	97.34	97.31
19	102.53	97.97	97.74	98.56	97.44	97.47	97.41	97.51	97.57	97.31	97.34	97.31
20	101.87	97.97	97.74	98.56	97.44	97.47	97.41	99.80	97.60	98.10	97.34	97.31
21	101.97	97.93	97.74	98.52	97.41	97.47	97.44	100.36	97.60	97.51	97.34	97.34
22	102.53	97.93	97.74	98.23	97.41	97.47	97.41	99.93	97.54	97.57	97.34	97.34
23	101.80	97.93	97.77	97.64	97.41	97.47	97.41	99.77	97.34	97.38	97.34	97.38
24	101.87	97.93	97.70	97.64	97.41	97.47	97.41	100.13	97.34	97.34	97.34	99.74
25	101.35	98.23	97.70	97.60	97.41	97.44	97.41	100.03	97.34	97.38	97.34	97.54
26	100.46	97.97	97.70	97.70	97.41	97.44	97.41	98.65	97.31	97.34	97.34	97.83
27	99.77	97.97	97.74	97.67	97.41	97.44	97.41	97.90	97.31	97.38	97.38	98.00
28	100.07	98.06	97.93	97.64	97.41	97.44	97.41	99.34	97.31	97.34	97.34	97.47
29	99.28	99.44	98.39	97.60	97.41	97.44	97.41	102.13	97.31	97.34	97.31	97.44
30	100.75		98.43	97.60	97.41	97.44	97.41	100.13	97.28	97.34	97.31	97.41
31	100.85		98.43		99.34		97.41	99.28		97.34		97.41
Avg.	102.73	99.66	97.93	98.32	97.53	97.53	97.42	98.34	97.53	97.40	97.37	97.45

09-5319.00 WELLTON-MOHAWK DRAINAGE WATER DISCHARGED TO COLORADO RIVER BELOW MORELOS DAM

DESCRIPTION: Water-stage recorder located on downstream end of the Wellton-Mohawk Drainage Extension Channel on the Arizona bank of the Colorado River at the east end of the weir section of Morelos Dam, 1.1 miles (1.8 km) downstream from the northerly international boundary. The elevation of the zero of the gage has not been determined.
RECORDS: Based on discharge measurements and a continuous record of gage heights. Station is operated by the United States Section of the Commission. Records available: November 16, 1965 through 1988.
REMARKS: Pursuant to Minute 218 of the Commission, an extension to the Wellton-Mohawk Drainage Conveyance Channel was constructed along the left bank of the Colorado River to a point immediately below Morelos Dam, a distance of about 12 miles (19.3 km), and placed in operation on November 16, 1965. Drainage flows may be discharged on an emergency basis to the Gila River and thence to the Colorado River at the diversion structure, Main Outlet Drain Extension No. 1, at the upstream end of the extension; directly to the Colorado River at Main Outlet Drain Extension No. 2, 1.9 miles (3.1 km) upstream from Morelos Dam; and directly to the Colorado River immediately below Morelos Dam at this station, Main Outlet Drain Extension No. 3. On July 14, 1972, Minute No. 241 of the Commission became effective. The Minute called for discharge of all Wellton-Mohawk drainage waters to be made below Morelos Dam. On August 30, 1973, Minute No. 242 of the Commission became effective. The Minute called for construction of a concrete-lined bypass drain from Morelos Dam to the Santa Clara Slough in Mexico. On June 23, 1977, the first flow was recorded in the bypass drain. Drainage flows through Main Outlet Extension No. 3 will be only on an emergency basis.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	174	0	0	0	0	0	0	0	0
2	0	0	0	174	0	0	0	0	0	0	0	0
3	0	0	0	173	0	0	0	0	0	0	0	0
4	0	0	0	170	0	0	0	0	0	0	0	0
5	0	0	0	174	0	0	0	0	0	0	0	0
6	0	0	0	171	0	0	0	0	0	0	0	0
7	0	0	0	174	0	0	0	0	0	0	0	0
8	0	0	0	176	0	0	0	0	0	0	0	0
9	0	0	0	177	0	0	0	0	0	0	0	0
10	0	0	0	177	0	0	0	0	0	0	0	0
11	0	0	0	175	0	0	0	0	0	0	0	0
12	0	0	0	167	0	0	0	0	0	0	0	0
13	0	0	0	163	0	0	0	0	0	0	0	0
14	0	0	0	170	0	0	0	0	0	0	0	0
15	0	0	0	183	0	0	0	0	0	0	0	0
16	0	0	0	188	0	0	0	0	0	0	0	0
17	0	0	0	187	0	0	0	0	0	0	0	0
18	0	0	0	186	0	0	0	0	0	0	0	0
19	0	0	0	185	0	0	0	0	0	0	0	0
20	0	0	0	184	0	0	0	0	0	0	0	0
21	0	0	0	186	0	0	0	0	4.7	0	0	0
22	0	0	0	117	0	0	0	0	4.8	0	0	0
23	0	0	0	.2	0	0	0	0	0	0	0	0
24	0	0	0	.1	0	0	0	0	0	0	0	0
25	0	0	0	.1	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	61.5	0	0	0	0	0	0	0	0	0
29	0	0	164	0	0	0	0	0	0	0	0	0
30	0		170	0	0	0	0	0	0	0	0	0
31	0		171		0		0	0		0		0
Sum	0	0	566.5	3,831.4	0	0	0	0	9.5	0	0	0

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1966-1988 Acre-Feet Average	Acre-Feet Maximum	Acre-Feet Minimum
Jan.	0	0		0		0	0	0	8,440	18,718	0
Feb.	0	0		0		0	0	0	6,569	16,992	0
Mar.	2.26	0	31	172	! 1	0	18.3	1,124	4,634	18,506	0
Apr.	2.42	0	16	192	26	0	128	7,599	4,150	18,601	0
May	0	0		0		0	0	0	6,256	19,091	0
June	0	0		0		0	0	0	4,922	18,756	0
July	0	0		0		0	0	0	4,522	18,946	0
Aug.	0	0		0		0	0	0	4,599	19,188	0
Sept.	1.87	0	22	128	! 1	0	.3	18.8	6,461	18,474	0
Oct.	0	0		0		0	0	0	9,095	19,200	0
Nov.	0	0		0		0	0	0	8,622	18,478	0
Dec.	0	0		0		0	0	0	7,830	19,121	0
Yearly	2.42	0		192		0	12.0	8,742	76,100	214,781	0
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
	0.74	0		5.44		0	0.34	10,783	93,868	264,928	0

! And other days

09-5325.00 ELEVEN MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging water from the West Main Canal to the Colorado River. This wasteway is located in Arizona, 4.3 miles (6.9 km) downstream from the northerly international boundary and 3.2 miles (5.1 km) downstream from Morelos Diversion Dam. It is the largest of three wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. Since June 1986, zero of the gage is 111.72 feet above mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1988, obtained by the United States Section; monthly discharge, January 1924 through 1950 by Bureau of Reclamation.

EXTREMES: Prior to January 1951, maximum monthly discharge, 9,740 acre-feet (12,014,000 m3) in August 1940; minimum monthly discharge, zero in April 1941. Since January 1, 1951, maximum instantaneous discharge, 800 second-feet (22.7 m3/sec) on December 3, 1961, at a maximum gage height of 117.60 feet (35.84 m); minimum instantaneous discharge, zero during parts of most years.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.9	3.5	1.3	2.3	0.2	0	2.4	0.1	0	3.8	2.2	4.0
2	5.8	4.6	8.6	.7	.3	0	13.1	1.1	0	0	3.1	15.9
3	.4	4.8	6.5	21.4	3.6	0	15.4	0	2.7	.5	6.4	11.8
4	.5	.1	2.2	17.3	10.1	0	8.3	0	.1	.1	16.5	54.0
5	9.7	.1	.6	5.2	.1	0	3.8	0	.8	5.8	2.9	12.5
6	12.3	.3	19.4	4.0	.1	0	1.7	1.8	.9	6.5	64.5	4.9
7	2.0	1.4	13.8	.4	2.2	0	12.0	5.0	1.5	2.3	18.5	2.7
8	16.0	3.7	5.6	.1	.3	.2	2.2	5.2	4.0	1.0	8.7	.2
9	4.2	.5	4.8	0	3.8	0	3.8	2.4	0	2.1	5.7	2.8
10	.3	1.5	1.2	0	14.8	0	1.9	.3	.1	2.1	2.6	1.6
11	.3	1.5	5.9	.1	.3	0	1.3	0	3.8	0	1.8	22.3
12	3.5	.8	.6	.1	2.7	1.1	6.7	0	0	.6	0	8.8
13	1.5	1.0	2.4	0	8.2	2.0	3.1	22.7	.7	3.4	6.1	5.9
14	6.1	4.2	2.9	0	.1	.2	0	4.0	.7	3.9	4.6	4.7
15	7.0	10.3	.6	0	49.1	.8	2.1	0	.1	2.3	0	10.7
16	5.1	1.4	2.7	.1	8.5	.1	4.8	2.4	.5	7.0	2.7	13.5
17	.7	3.5	1.5	3.8	.5	1.8	1.9	4.9	.1	.8	.2	1.0
18	2.8	4.9	.1	6.8	.5	2.7	.6	.4	2.7	2.6	1.5	18.5
19	.4	.6	0	.5	.2	0	0	0	0	.6	2.9	14.5
20	6.2	1.4	0	1.2	2.6	0	.2	0	.1	4.3	8.4	21.1
21	12.6	4.6	1.4	.4	.3	0	.3	7.7	2.0	7.9	4.4	17.9
22	9.3	.4	2.1	.1	.7	0	0	4.5	.5	18.0	1.4	2.1
23	5.2	1.4	1.0	.1	.4	0	0	.1	4.0	5.1	3.6	6.6
24	34.6	1.9	.2	8.7	.1	.9	* 22.6	0	1.2	4.7	0	13.9
25	23.1	2.8	1.7	7.6	.1	0	" 27.3	0	.1	4.7	4.7	.3
26	3.6	0	.2	.2	.2	0	* 5.4	.1	.3	5.3	16.2	.3
27	2.7	8.7	.1	2.5	0	.7	4.5	0	.2	2.3	8.3	.3
28	.1	15.4	.1	1.1	.9	0	0	4.9	1.4	5.2	14.2	1.1
29	3.4	16.7	.2	.8	0	0	0	0	3.1	.2	12.0	1.1
30	2.3		.7	.1	.2	2.3	0	0	2.1	3.4	4.7	.2
31	.5		1.5		1.5		0	0		10.9		1.2
Sum	183.1	102.0	89.9	85.6	112.6	12.8	145.4	67.6	33.7	117.4	228.8	276.4

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1935-1988 Acre-Feet Average	Maximum	Minimum
Jan.	2.42	0	24	122	! 1	0	5.9	363	2,500	9,570	0
Feb.	1.31	0	29	68.0	! 4	0	3.5	202	2,048	8,430	14.5
Mar.	2.14	.01	6	101	! 1	0	2.9	178	1,925	6,230	59.1
Apr.	2.46	0	3	125	! 9	0	2.9	170	1,780	6,300	0
May	3.33	0	15	202	! 9	0	3.6	223	2,104	9,320	8.3
June	.31	0	13	7.3	! 1	0	.4	25.4	2,001	7,440	10.5
July	" 2.98	0	24	" 169	!13	0	4.7	288	2,010	8,320	9.1
Aug.	1.83	0	13	79.6	1	0	2.2	134	1,740	9,740	51.8
Sept.	.46	0	11	12.9	! 1	0	1.1	66.8	1,258	6,140	6.0
Oct.	.89	0	!22	36.1	! 1	0	3.8	233	1,717	5,680	11.9
Nov.	3.85	0	6	253	!10	0	7.6	454	2,086	8,220	18.8
Dec.	2.66	.03	4	142	! 1	.1	8.9	548	2,731	9,430	61.9
Yearly	3.85	0		253		0	4.0	2,885	23,900	82,900	943
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
	1.17	0		7.16		0	0.11	3,559	29,480	102,255	1,163

! And other days " Estimated * Partly estimated

09-5221.00 COLORADO RIVER AT ELEVEN MILE GAGE - STAGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, 4.3 miles (6.9 km) downstream from northerly international boundary, 3.2 miles (5.1 km) downstream from Morelos Diversion Dam, about 50 feet (15 m) downstream from the mouth of Eleven Mile Wasteway of the Yuma Project, and 11 miles (17.7 km) downstream from Yuma, Arizona, along the river levee. The zero of the gage is at mean sea level, U. S. C. & G. S. datum. On April 1, 1988, the gage was relocated 1,310 ft. downstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is 0.38 ft. lower than the old gage.

RECORDS: Mean daily gage heights based on continuous water-stage records. Records available: Continuous record of gage heights, November 1947 through 1988; once weekly readings obtained by the U. S. Bureau of Reclamation, January 1940 through October 1947.

REMARKS: This station is maintained by the United States Section of the Commission as part of the continuing study of channel conditions in the limitrophe section of the river.

EXTREMES: Since November 1947, maximum mean daily gage height, 108.77 feet (33.15 m) on June 28, 1983; minimum mean daily gage height, 94.00 feet (28.65 m) on September 13, 1988 and other days since that time.

MEAN DAILY GAGE HEIGHT IN FEET 1988

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	100.20	97.27	* 95.48	94.95	94.20	96.36	94.19	94.24	94.50	94.06	94.12	94.11
2	100.31	96.54	* 95.29	94.97	94.18	94.28	94.27	94.23	94.20	94.03	94.14	94.23
3	100.81	97.96	* 95.15	95.04	94.18	94.19	94.33	94.22	94.13	94.04	94.10	94.22
4	101.40	97.77	* 95.05	95.05	94.25	94.15	94.27	94.21	94.10	94.04	94.27	94.45
5	100.85	98.90	* 95.05	95.32	94.15	94.12	94.25	* 94.21	94.07	94.07	94.13	94.22
6	100.60	99.45	* 95.32	95.33	94.15	94.10	94.23	* 94.21	94.08	94.09	94.41	94.15
7	100.80	99.56	* 95.07	95.00	94.17	94.09	94.31	* 94.21	94.10	94.08	94.23	94.14
8	101.49	98.62	* 95.03	95.00	94.15	94.10	94.24	* 94.21	94.08	94.70	94.12	94.05
9	101.55	97.82	* 95.13	94.96	94.16	94.11	94.23	* 94.21	94.03	94.08	94.10	94.10
10	102.00	97.21	* 95.82	94.97	94.28	94.11	94.22	* 94.19	94.03	94.04	94.08	94.11
11	101.92	97.27	* 95.02	94.99	94.15	94.12	94.21	94.17	94.05	94.02	94.08	94.30
12	99.96	97.37	* 95.01	94.98	94.16	94.14	94.25	94.16	94.02	94.03	94.07	94.21
13	100.22	96.93	* 94.99	94.97	94.23	94.16	94.23	94.32	94.00	94.05	94.11	94.21
14	101.37	96.96	* 94.98	94.96	94.12	94.15	94.20	94.20	94.01	94.55	94.13	94.20
15	101.37	* 95.94	* 94.97	95.01	94.42	94.16	94.22	94.16	94.01	94.25	94.05	94.26
16	100.44	* 95.26	* 95.38	95.08	94.23	94.16	94.28	94.17	94.00	94.10	94.06	94.33
17	100.55	* 95.11	95.08	97.59	94.13	94.17	94.30	94.20	94.00	94.07	94.06	94.20
18	100.27	* 95.10	94.95	95.46	94.10	94.18	94.22	94.17	94.01	94.06	94.07	94.35
19	99.53	* 95.10	94.93	95.04	94.08	94.17	94.21	94.17	94.01	94.05	94.06	94.30
20	98.97	* 95.10	94.92	95.02	94.06	94.17	94.20	96.33	94.02	94.50	94.12	94.41
21	98.99	* 95.09	95.00	95.01	94.02	94.18	94.20	97.23	94.03	94.27	94.09	94.37
22	99.43	* 95.08	95.08	94.90	94.05	94.17	94.19	* 97.02	94.09	94.32	94.09	94.26
23	98.57	* 95.07	95.02	94.29	94.05	94.17	94.21	* 96.78	94.04	94.14	94.10	94.30
24	98.58	95.07	94.91	94.29	94.04	94.20	94.32	96.88	94.05	94.11	94.08	* 96.51
25	98.06	95.49	95.03	94.30	94.04	94.15	94.35	98.71	94.05	94.11	94.10	* 94.41
26	97.24	95.07	94.92	94.24	94.03	94.18	94.26	98.36	94.03	94.11	94.23	94.15
27	96.63	95.07	94.91	94.27	94.03	94.17	94.25	96.06	94.04	94.10	94.13	* 94.68
28	* 96.85	95.08	94.96	94.25	94.03	94.13	94.20	95.47	94.03	94.13	94.19	94.15
29	* 96.36	96.25	95.28	94.22	94.07	94.17	94.19	98.54	94.03	94.08	94.19	94.15
30	* 97.59		95.31	94.22	94.07	94.16	94.19	96.52	94.04	94.09	94.10	94.13
31	* 97.65		95.31		95.54		94.21	95.72		94.17		94.13
Avg.	99.63	96.50	95.11	94.92	94.18	94.23	94.24	95.27	94.06	94.15	94.13	94.32

* Partly estimated

09-5330.00 TWENTY-ONE MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway from West Main Canal to Colorado River. Located on east side of levee at site used prior to May 1, 1971. The site used May 1, 1971 to September 20, 1977 was located 200 feet (61 m) downstream from present site on west side of levee. This wasteway is located in Arizona, 18.5 miles (29.8 km) downstream from the northerly international boundary, 17.4 miles (28.0 km) downstream from Morelos Diversion Dam, and 2.2 miles (3.5 km) upstream from the southerly international boundary. It is the farthest downstream of the two wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. The elevation of the zero of the gage at the new location has not been determined.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1988, obtained by the United States Section; monthly discharge, March 1939 through 1950, by Bureau of Reclamation.

REMARKS: This wasteway was completed and flow began March 14, 1939. Since May 13, 1944, waste water from the West Main Canal which previously discharged across the southerly land boundary has been returned to the Colorado River through this wasteway. The West Main Canal Wasteway was completed in February of 1971, and the waste water from the West Main Canal is normally discharged across the southerly land boundary.

EXTREMES: Prior to January 1951, maximum monthly discharge 2,860 acre-feet (3,528,000 m3) in January 1946; minimum monthly discharge, 122 acre-feet (150,000 m3) in September 1950. Since January 1, 1951, maximum instantaneous discharge, 102 second-feet (2.89 m3/sec) on January 24, 1954, at a maximum gage height of 95.46 feet (29.10 m) (old datum); minimum instantaneous discharge, zero during a part of most months.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.9	0.5	3.5	0.2	0.4	0.5	5.5	0.6	1.1	0.4	8.3	1.0
2	3.7	.5	2.5	.7	1.1	.2	.9	2.5	.8	.9	3.5	.7
3	14.0	.3	3.7	1.2	1.1	.1	.7	.5	1.5	1.2	4.1	.7
4	11.8	.3	1.1	1.1	.6	.1	.7	.2	1.3	7.0	8.6	.6
5	9.8	4.1	.4	.1	.7	.2	.6	.6	1.2	7.0	2.5	.5
6	8.7	9.6	.5	0	.4	.2	1.1	.7	.9	14.7	14.4	.2
7	12.8	1.0	6.0	.4	.6	.1	.8	.8	.3	5.6	18.6	.1
8	13.0	7.2	1.5	.4	.8	.3	.3	.7	.3	.7	3.1	.5
9	14.8	1.0	.1	.7	.5	.3	.6	.7	.1	9.3	.8	.7
10	6.1	.5	.9	.8	.5	.2	.5	.4	.1	6.1	.7	1.2
11	10.2	.2	2.2	.6	.3	.1	1.9	.6	.3	.9	8.7	1.1
12	16.3	.2	1.2	1.5	.3	.2	12.6	.9	.5	1.1	.8	1.1
13	7.1	.9	.7	.4	.5	.5	1.7	.9	.4	.7	1.5	.9
14	.8	.7	2.8	.6	.4	.4	1.1	.5	.5	4.6	1.6	4.1
15	1.0	.9	2.0	1.3	.8	.5	.9	.5	.5	7.9	1.2	11.3
16	.7	.8	2.1	1.0	.4	.7	1.3	.7	.9	3.8	1.4	2.1
17	.9	.7	2.1	1.3	0	.5	1.8	.5	.9	.9	1.0	1.3
18	.8	.6	1.2	1.6	0	.6	1.3	1.4	1.0	7.9	.9	1.7
19	1.2	.1	1.3	.8	0	.8	1.1	.9	1.8	18.2	.7	2.0
20	1.3	.1	1.1	.8	.2	.7	1.7	1.1	.6	10.4	1.4	1.6
21	.8	.3	1.1	1.4	.3	.5	1.5	1.6	.7	12.2	1.7	1.9
22	.2	.7	1.7	.9	.1	.1	1.3	1.2	.7	10.5	1.5	2.2
23	.1	.7	.7	.3	.1	0	.9	.8	1.0	15.3	1.4	1.9
24	.1	.4	.4	.1	.1	.1	1.1	.4	.8	13.2	1.7	1.5
25	.2	.4	.5	1.6	.1	.7	1.0	.3	1.1	14.2	1.4	1.2
26	0	.3	1.6	1.3	.2	.4	.4	.8	1.8	6.2	1.8	1.1
27	0	1.8	.5	2.7	.6	.7	.2	.7	1.2	2.3	1.7	2.3
28	0	4.4	.2	7.1	.4	.5	.5	.8	.9	1.4	1.9	1.3
29	.1	5.3	.5	3.4	.3	.5	.3	1.2	.8	1.3	1.8	1.4
30	.1		.3	1.3	.3	3.0	.4	1.5	.6	8.3	1.7	1.9
31	.2		.5		.5		.4	1.2		6.4		1.6
Sum	146.7	44.5	44.9	35.6	12.6	13.7	45.1	26.2	24.6	200.6	100.4	51.7

Current Year 1988 — **Period 1939-1988**

Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	2.24	0	3	58.9	!22	0	4.7	291	619	2,860	0
Feb.	1.88	.03	8	44.4	!19	0	1.5	88.3	533	2,510	0
Mar.	1.27	0	7	23.6	! 9	0	1.4	89.1	484	1,660	0
Apr.	.91	0	28	13.8	! 1	0	1.2	70.6	519	1,940	0
May	.27	0	8	1.9	! 6	0	.4	25.0	630	2,470	0
June	2.13	.01	30	54.3	! 4	0	.5	27.2	555	2,350	0
July	1.59	.06	1	33.9	27	.2	1.5	89.5	481	1,950	0
Aug.	2.03	.05	2	50.3	! 1	.1	.8	52.0	502	2,530	0
Sept.	1.39	.03	19	27.3	!10	0	.8	48.8	447	2,180	0
Oct.	1.87	.05	22	44.1	5	.1	6.5	398	556	2,100	0
Nov.	1.77	.04	11	40.3	10	.1	3.3	199	666	2,380	0
Dec.	2.15	0	14	55.2	! 7	0	1.7	103	708	2,680	0
Yearly	2.24	0		58.9		0	2.0	1,482	6,700	24,370	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.68	0		1.67		0	0.06	1,828	8,264	30,060	0

! And other days

09-5345.00 EAST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir located about 300 feet (91.4 m) north of the international boundary near San Luis, Arizona and 1.5 miles (2.4 km) east of the Colorado River. From September 28, 1977 to April 6, 1978, recorder moved west 100 feet (30.5 m) to a temporary bypass channel. On April 7, 1978 recorder was moved back to original site.
RECORDS: Wasteway discharges computed by United States Section of the Commission beginning November 1, 1953, from head on control weir as measured by water-stage recorder and weir ratings as determined by current meter measurements. Records available: October 1946 through 1988. Records of monthly discharges also are available for the periods January 1924 through June 1928, January 1932 through 1933, and April 1935 through September 1946.
REMARKS: Wasteway discharges from the East Main Canal comprise regulatory waste and drainage waters from the eastern half of the Valley Division of the Yuma Project and are considered as part of the volumes arriving at the limitrophe section of the Colorado River.

Mean Daily Discharge in Second-Feet 1988 — Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.8	0	2.7	8.2	13.2	1.9	6.4	8.3	3.0	6.8	2.3	1.9
2	6.7	2.0	10.7	2.6	23.2	.1	7.4	8.5	3.2	6.3	12.9	4.1
3	2.9	2.3	10.2	13.0	11.7	.9	5.9	7.8	11.5	13.2	19.5	4.1
4	14.2	.3	1.6	5.8	.8	.7	6.9	6.5	5.1	4.0	2.8	4.1
5	10.4	4.7	1.2	0	9.0	9.0	1.9	6.4	0	0	1.8	4.1
6	3.1	11.1	27.4	.1	14.3	12.8	3.2	.9	2.3	7.4	2.1	4.1
7	6.1	15.9	8.8	.7	7.3	5.0	1.0	5.6	16.0	1.3	6.7	12.1
8	3.6	1.9	.3	2.5	6.4	.7	.8	.8	8.6	1.9	6.0	.4
9	1.4	.1	3.7	4.0	3.3	1.1	.4	1.4	5.9	0	4.3	.8
10	.2	0	.5	1.8	4.2	3.4	11.0	.7	10.0	2.8	6.4	2.1
11	0	0	5.6	1.1	3.6	3.7	5.2	.5	2.4	6.1	2.2	1.8
12	2.5	0	1.0	4.3	2.1	12.4	.3	1.0	.2	5.0	1.8	2.3
13	.4	0	.1	1.7	3.3	.9	.2	2.7	0	3.1	12.4	11.6
14	4.1	0	0	12.4	6.3	.4	2.6	4.4	0	23.6	15.7	12.3
15	.5	0	1.0	18.6	9.0	1.4	.3	1.9	0	13.2	4.1	12.0
16	4.5	0	2.3	16.0	17.2	9.4	.3	.1	.3	7.5	5.5	15.0
17	5.5	0	.2	19.9	2.5	6.6	1.3	5.5	1.1	2.1	1.3	4.7
18	4.9	0	0	2.6	.4	9.9	.7	.1	.8	12.7	2.4	25.3
19	6.3	3.5	0	2.9	0	17.1	6.1	6.4	1.4	8.4	.6	10.0
20	3.9	0	12.2	2.7	0	19.2	9.1	12.2	1.6	5.5	.6	2.4
21	9.6	0	11.4	1.5	.5	9.5	1.8	1.7	.1	9.9	.1	2.4
22	5.8	6.5	8.5	14.3	11.1	7.4	1.0	.2	11.0	.9	0	.3
23	1.4	1.3	6.6	5.8	10.8	6.1	1.8	4.2	2.5	0	1.0	3.2
24	.1	4.7	3.0	2.5	3.8	5.4	4.9	12.3	5.0	.7	3.1	11.9
25	3.9	8.4	9.6	2.9	4.1	.6	3.7	4.2	3.8	.1	13.8	3.4
26	.3	.9	4.4	1.5	4.6	4.1	1.8	6.5	3.9	2.0	2.8	1.5
27	0	12.5	11.9	.5	11.2	26.0	.6	.3	2.8	1.3	21.4	12.5
28	.2	3.7	1.2	1.6	9.3	2.1	7.9	.8	5.2	8.1	11.6	8.6
29	.1	1.1	.2	2.4	.7	1.9	2.3	.5	2.0	5.1	5.8	7.1
30	7.8		5.0	17.2	11.8	15.9	2.7	0	.2	.1	15.5	7.9
31	.2		4.1		4.3		15.2	0		0		5.1
Sum	115.4	80.9	155.4	171.1	210.0	195.6	114.7	112.4	109.9	159.1	186.5	199.1

Current Year 1988									Period 1935-1988		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.	1.13	0	30	43.7	!10	0	3.7	229	967	3,360	90.0
Feb.	.97	0	19	33.3	! 1	0	2.8	160	810	3,170	133
Mar.	1.01	0	! 6	35.8	!13	0	5.0	308	931	2,920	142
Apr.	1.28	0	1	54.6	5	0	5.7	339	912	3,170	175
May	1.05	0	12	38.4	!19	0	6.8	417	1,014	3,040	228
June	1.45	0	20	68.1	! 2	0	6.5	388	861	3,660	161
July	.99	0	10	34.6	!17	0	3.7	228	919	3,590	170
Aug.	.83	0	7	25.3	!12	0	3.6	223	942	3,960	159
Sept.	.95	0	7	32.1	! 1	0	3.7	218	906	3,170	159
Oct.	1.23	0	18	50.8	! 1	0	5.1	316	942	3,280	307
Nov.	1.00	0	! 3	35.2	! 1	0	6.2	370	1,020	3,570	241
Dec.	1.12	0	18	43.1	! 8	0	6.4	395	987	3,080	247
Yearly	1.45	0		68.1		0	4.9	3,591	11,211	38,310	3,026
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.44	0		1.93		0	0.14	4,429	13,829	47,255	3,733

! And other days

09-5340.00 YUMA MAIN DRAIN (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorders located in the forebay and afterbay, with flow meters in the four discharge pipes at the Boundary Pumping Plant on the Main Drain about 200 feet (61 m) north of the international boundary near San Luis, Arizona, 1.3 miles (2.1 km) east of the Colorado River.

RECORDS: Main Drain discharges are lifted 10 (3.05) to 12 feet (3.66 m) at the pumping plant. Prior to April 1, 1969, discharges were computed from pump ratings and the differential head measured by the two gages. Beginning April 1, 1969 discharges were computed from flow meter charts. Pump ratings and flow meter discharges are checked by current meter measurements. Records obtained and computed by the United States Section of the Commission. Records available: Monthly discharges, June 1919 through 1951; daily discharges January 1952 through 1988.

REMARKS: Flows in the Main Drain are principally drainage waters from the Valley Division of the Yuma Project. The Main Drain, the East Main Canal Wasteway, West Main Canal Wasteway, and 242 Lateral discharge into Mexico at the international land boundary near San Luis, Sonora. The water is used for irrigation in Mexico on the left (Sonora) bank of the Colorado River and is considered as part of the volumes arriving at the limitrophe section of the river.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	135	125	127	126	124	120	108	117	97.8	163	179	163
2	126	106	138	121	119	107	109	120	113	162	175	162
3	132	106	127	144	118	113	104	122	114	189	184	165
4	135	112	130	149	120	112	114	125	113	206	181	158
5	146	125	134	133	124	119	113	122	117	169	172	156
6	135	124	129	122	112	105	106	128	109	167	163	141
7	149	134	137	122	128	103	118	127	113	162	162	154
8	149	133	121	123	120	113	111	121	119	163	164	150
9	144	126	122	124	124	103	114	115	121	161	154	146
10	130	119	121	123	125	103	116	117	117	170	163	153
11	130	127	127	121	126	111	105	106	117	167	166	154
12	133	134	128	123	125	98.7	106	107	117	171	168	156
13	139	129	126	122	126	98.0	110	119	120	176	169	147
14	128	130	126	136	126	102	109	120	133	178	175	146
15	136	125	129	127	150	116	105	128	142	194	165	149
16	133	117	130	137	142	120	113	129	142	184	155	154
17	128	133	126	137	119	108	123	125	127	197	152	150
18	136	131	129	126	111	108	119	129	131	196	154	163
19	122	131	143	129	112	102	122	128	140	198	171	146
20	121	124	138	138	113	99.3	119	130	132	175	156	134
21	128	131	134	120	112	117	116	129	137	186	148	142
22	132	128	117	129	114	111	117	126	133	180	150	134
23	143	126	118	115	122	107	119	116	141	156	147	134
24	149	124	117	120	115	113	119	127	140	185	150	131
25	134	152	128	121	128	103	115	101	141	176	154	137
26	120	131	114	120	124	114	106	110	144	169	148	127
27	121	132	130	116	125	104	109	123	144	168	155	134
28	130	144	113	119	138	106	113	133	145	186	152	134
29	139	126	105	117	131	110	110	112	150	187	151	142
30	132		124	123	119	109	111	88.0	159	174	154	138
31	123		124		112		117	102		168		142
Sum	4,138	3,685	3,912	3,783	3,804	3,255.0	3,496	3,702.0	3,868.8	5,483	4,837	4,542

Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
			Current Year 1988						**Period 1935-1988**		
Jan.			! 7	149	26	120	133	8,208	7,617	11,203	1,740
Feb.			25	152	! 2	106	127	7,309	7,440	11,988	1,640
Mar.			19	143	29	105	126	7,759	8,535	12,430	1,940
Apr.			4	149	23	115	126	7,503	8,405	11,890	1,920
May			15	150	18	111	123	7,545	8,589	13,140	1,950
June			! 1	120	13	98.0	109	6,456	7,981	12,040	2,290
July			17	123	3	104	113	6,934	7,940	11,930	2,530
Aug.			28	133	30	88.0	119	7,343	7,933	11,960	2,560
Sept.			30	159	1	97.8	129	7,674	7,922	11,568	2,280
Oct.			4	206	23	156	177	10,875	8,912	12,385	2,940
Nov.			3	184	23	147	161	9,594	8,487	12,010	2,800
Dec.			3	165	26	127	147	9,009	8,104	11,480	2,450
				206		88.0	133	96,209	97,865	139,380	27,040
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				5.83		2.49	3.77	118,672	120,715	171,922	33,353

Ø Mean daily ! And other days

09-5343.00 WEST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder located about 0.3 mile (0.5 km) upstream from outlet to Yuma Main Drain, which is 175 feet (53.3 m) upstream from East Main Canal Wasteway outlet and 0.4 mile (0.6 km) west of San Luis, Arizona. Prior to August 1, 1975, the recorder was located about 150 feet (45.7 m) upstream from outlet to Yuma Main Drain.
RECORDS: Wasteway discharges computed by United States Section of the Commission beginning February 23, 1971, from water-stage recorder and ratings as determined by current meter measurements. Records available: February 23, 1971 through 1988.
REMARKS: Wasteway discharges from West Main Canal Wasteway comprise regulatory waste from the West Main Canal.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	19.7	6.4	0	2.9	2.1	4.7	1.6	13.5	3.5	2.6	19.1
2	10.1	16.3	.9	.6	4.2	3.9	4.3	10.7	5.4	14.7	1.8	5.6
3	6.2	5.9	3.1	25.7	1.0	.1	11.0	7.1	23.8	20.9	.1	.4
4	2.2	7.3	3.0	38.6	3.2	.3	15.6	3.5	13.1	5.2	1.5	12.8
5	2.1	11.7	2.2	3.3	4.9	4.1	7.6	1.1	10.4	.8	.6	32.3
6	1.1	1.3	18.0	.3	1.4	2.5	8.4	25.5	11.7	.1	6.5	2.8
7	3.3	18.9	27.2	4.8	3.7	1.4	9.0	22.7	.9	0	1.4	.4
8	.9	26.0	3.0	7.4	12.2	.1	.8	17.2	9.0	0	.1	3.3
9	0	10.6	1.3	2.8	4.3	5.9	6.5	21.5	12.5	.8	0	19.8
10	0	6.6	6.7	4.5	2.3	7.9	4.1	3.5	13.9	.8	0	20.3
11	.7	2.4	3.3	8.8	3.5	6.9	3.6	2.3	14.0	0	15.2	15.1
12	.6	7.1	3.4	13.8	2.1	14.2	2.4	6.4	3.7	12.3	5.6	7.9
13	3.2	8.8	1.4	.3	11.5	13.0	0	8.7	6.8	12.5	30.3	3.3
14	10.1	16.6	11.1	1.3	9.6	12.1	2.9	10.8	3.2	17.9	26.0	11.6
15	23.6	12.3	10.1	6.6	23.6	6.0	6.6	13.2	4.8	8.4	18.7	18.3
16	19.2	12.3	4.3	3.3	12.4	6.2	13.9	15.6	4.5	7.8	17.8	17.8
17	17.3	6.1	4.8	6.1	1.0	8.7	11.4	4.5	2.3	8.8	13.3	10.6
18	12.5	9.2	5.1	8.4	.4	13.5	4.3	8.2	5.6	4.5	6.3	14.1
19	18.6	.6	11.0	2.0	.2	8.5	12.6	15.2	4.9	8.3	7.5	22.5
20	9.1	.7	9.5	.1	1.7	8.5	4.1	9.7	2.0	5.6	24.5	11.9
21	15.9	5.2	7.7	.8	.9	9.2	5.3	30.3	10.2	8.0	4.7	24.2
22	15.2	6.1	14.1	1.8	11.5	5.4	5.3	17.8	3.1	1.0	2.4	27.3
23	10.2	3.4	1.4	.2	7.2	3.9	3.7	2.2	3.7	0	2.1	21.5
24	10.1	8.5	1.6	0	7.3	6.7	9.5	.8	.2	.2	.8	21.8
25	30.1	5.3	0	9.0	9.0	5.4	17.7	7.2	2.1	12.4	18.5	
26	4.1	1.1	.2	.1	4.7	9.9	2.1	25.1	18.4	2.2	19.9	15.8
27	.5	4.0	.4	.1	9.8	7.8	.2	17.2	12.6	4.1	6.0	26.7
28	.9	8.7	1.0	.7	10.5	4.3	1.3	21.1	13.0	1.0	1.8	20.3
29	7.4	13.9	5.2	5.1	10.1	9.0	4.0	16.2	4.8	.8	5.4	12.5
30	7.8		2.3	5.2	10.0	7.1	7.7	15.1	11.8	.5	2.1	30.1
31	20.3		9.6		4.1		4.0	26.1		4.8		23.4
Sum	267.4	256.6	179.3	161.7	191.2	194.6	194.6	388.1	251.0	157.6	237.4	492.0

Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.	1.95	0	24	51.4	! 1	0	8.6	530	344	565	39.5
Feb.	1.98	0	6	52.9	! 7	0	8.8	509	408	681	159
Mar.	1.96	0	7	51.9	! 1	0	5.8	356	435	939	203
Apr.	2.06	0	4	57.2	! 1	0	5.4	321	342	664	164
May	1.84	0	13	45.9	! 2	0	6.2	379	302	434	148
June	1.66	0	15	37.6	! 1	0	6.5	386	287	480	45.2
July	1.72	0	5	40.3	! 1	0	6.3	386	286	556	62.7
Aug.	1.88	0	6	47.9	! 1	0	12.5	770	323	770	98.0
Sept.	1.89	.01	8	48.4	! 7	0	8.4	498	371	768	190
Oct.	1.98	0	13	52.9	! 1	0	5.1	313	357	728	133
Nov.	2.27	0	26	69.0	! 1	0	7.9	471	330	541	26.2
Dec.	2.23	.01	21	66.6	! 3	0	15.9	976	386	976	35.3
	2.27	0		69.0		0	8.1	5,895	4,171	6,229	2,577
Yearly	Meters		Cubic Meters per Second						Thousands of Cubic Meters		
	0.69	0		1.95		0	0.23	7,271	5,145	7,683	3,179

Current Year 1988 — Period 1971-1988

! And other days

09-5345.50 242 WELL FIELD NEAR SAN LUIS, ARIZONA

DESCRIPTION: Water-stage recorder and 12-foot (3.7 m) Parshall flume located 100 feet (30.5 m) upstream from confluence of East Main Canal Wasteway, 110 feet (33.5 m) north of the southerly land boundary, and 1.4 miles (2.3 km) east of the Colorado River.
RECORDS: Based on current meter measurements and a continuous record of gage heights. The station is operated by the United States Section of the Commission. Records available: October 18, 1978 through 1988.
REMARKS: Records show the pumping of ground water from the 242 well field east of San Luis, Arizona.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	4.6	4.9	8.2	2.8	0.4	1.2	7.8	6.3	3.7	0
2	0	0	.1	7.2	4.9	1.3	3.0	2.9	7.6	8.3	.1	0
3	0	0	0	4.8	7.6	.9	4.8	2.8	2.5	4.6	0	1.7
4	0	0	0	6.0	5.6	1.5	3.9	5.9	3.2	2.5	0	7.9
5	0	0	0	5.0	6.9	7.6	.5	1.2	.3	4.8	0	6.5
6	0	0	0	5.7	6.5	4.1	.3	.2	2.3	4.1	0	6.6
7	0	0	0	5.2	5.7	2.0	.8	1.5	8.2	3.8	0	6.4
8	0	0	0	5.1	8.1	1.3	3.1	2.4	7.4	4.6	0	5.8
9	0	0	0	6.3	5.3	0	.7	.1	7.6	7.4	0	5.0
10	0	0	.1	5.4	4.0	4.1	4.8	2.3	7.9	4.8	0	5.0
11	0	0	.5	3.8	4.9	7.9	5.2	3.4	2.0	3.5	0	5.1
12	0	0	4.4	6.7	4.8	13.2	4.5	4.6	6.1	4.4	0	3.3
13	0	0	0	9.6	3.9	10.1	.7	2.9	12.8	3.6	0	1.2
14	0	0	0	6.1	4.2	6.6	4.9	2.0	13.4	3.6	0	.9
15	0	0	1.3	8.1	2.4	8.4	1.6	2.0	4.9	7.3	1.9	1.7
16	0	0	.1	4.8	4.7	8.8	.1	2.2	0	7.4	0	3.0
17	0	0	.6	2.4	2.6	6.8	4.5	4.5	.1	4.9	0	1.7
18	0	3.4	4.0	2.4	3.2	3.1	5.5	2.3	1.0	2.2	0	1.4
19	0	5.7	3.4	4.7	4.5	7.5	2.3	4.4	0	4.8	0	3.0
20	3.2	6.4	7.1	3.1	2.6	4.4	.5	1.1	3.2	6.9	0	3.2
21	5.3	6.0	4.1	5.4	4.1	1.9	3.7	3.4	24.3	4.4	0	3.4
22	4.6	6.8	.4	3.2	2.7	2.0	2.0	4.3	39.9	7.6	0	2.6
23	.1	5.2	2.9	6.3	3.8	2.4	2.1	1.3	17.0	5.7	0	4.9
24	0	6.1	6.6	8.2	2.1	3.1	3.1	.8	4.9	3.0	0	4.8
25	0	5.2	5.7	5.5	3.7	2.1	2.8	3.5	8.2	4.5	0	7.6
26	1.5	5.6	3.1	3.7	2.9	4.8	.8	7.6	9.1	4.5	0	7.8
27	.1	4.4	4.8	4.6	.6	3.9	.2	3.0	10.0	5.6	0	5.7
28	0	6.4	6.6	3.0	2.2	2.9	.6	.2	4.4	4.0	0	4.7
29	0	5.1	4.9	2.6	1.9	7.3	1.5	2.2	6.6	3.1	0	7.4
30	0		7.0	5.3	1.6	3.9	1.5	1.6	4.4	7.1	0	7.7
31	0		7.4		1.2		1.4	4.6		6.2		7.8
Sum	14.8	66.3	79.7	155.1	127.4	136.7	71.8	82.4	227.1	155.5	5.7	133.8

Current Year 1988									Period 1979-1988		
Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High Day	High	Low Day	Low			Average	Maximum	Minimum
Jan.	0.32	0	26	8.2	! 1	0	0.5	29.4	359	2,761	0
Feb.	.43	0	22	12.8	! 1	0	2.3	132	430	2,257	0
Mar.	.31	0	127	7.8	! 2	0	2.6	158	366	2,132	0
Apr.	.49	.01	13	15.6	11	0	5.2	308	438	2,681	0
May	.42	.02	19	12.4	127	0	4.1	253	720	2,750	11.3
June	.47	0	12	14.7	! 3	0	4.6	271	689	2,800	21.4
July	.36	0	12	9.8	! 1	0	2.3	142	710	3,020	16.3
Aug.	.37	0	31	10.2	! 6	0	2.7	163	573	2,073	0
Sept.	1.13	0	13	55.5	! 5	0	7.6	450	707	2,326	0
Oct.	.42	.02	22	12.4	! 1	0	5.0	308	575	2,711	0
Nov.	.39	0	15	11.0	! 2	0	.2	11.3	182	1,011	0
Dec.	.40	0	10	11.5	! 1	0	4.3	265	467	2,962	0
	1.13	0		55.5		0	3.4	2,491	6,216	23,566	163
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.34	0		1.57		0	0.10	3,073	7,667	29,068	201

! And other days

09-5348.00 TOTAL FLOWS CROSSING INTERNATIONAL BOUNDARY INTO MEXICO NEAR SAN LUIS, SONORA

DESCRIPTION: The tabulated data below are the combined flows of the East Main Canal Wasteway, West Main Canal Wasteway, 242 Lateral, and the Yuma Main Drain and represent the total water crossing the international land boundary into the Sanchez Mejorada Canal near San Luis, Arizona. The mean daily discharges are combined and rounded and the monthly volumes are obtained by adding the volumes of the four stations.

RECORDS: Records obtained and computed by the United States Section of the Commission. Records available: February 23, 1971 through 1988; 242 Lateral from November 1978 through 1988.

REMARKS: Descriptions and flows of the individual stations, East Main Canal Wasteway, West Main Canal Wasteway, the Yuma Main Drain, and 242 Lateral are published separately on preceding pages of this bulletin.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	144	145	141	139	148	127	120	128	122	180	188	184
2	143	124	150	131	151	112	124	142	129	191	190	172
3	141	114	140	188	138	115	126	140	152	228	204	171
4	151	120	135	199	130	115	140	141	134	218	185	183
5	159	141	137	141	145	140	123	131	128	175	174	199
6	139	136	174	128	134	124	118	155	125	179	172	155
7	158	169	173	133	145	111	129	157	138	167	170	173
8	154	161	124	138	147	115	116	141	144	170	170	160
9	145	137	127	137	137	110	122	138	147	169	158	172
10	130	126	128	135	136	118	136	124	149	178	169	180
11	131	129	136	135	138	130	119	112	135	177	183	176
12	136	141	137	148	134	139	113	119	127	193	175	170
13	143	138	128	134	145	122	111	133	140	195	212	163
14	142	147	137	156	146	121	119	137	150	223	217	171
15	160	137	141	160	185	132	114	145	152	223	190	181
16	157	129	137	161	176	144	127	147	147	207	178	190
17	151	139	132	165	125	130	140	140	131	213	167	167
18	153	144	138	139	115	135	130	140	138	215	163	204
19	147	141	157	139	117	135	143	154	146	220	179	182
20	137	131	167	144	117	131	133	153	139	193	181	152
21	159	142	157	128	118	138	127	164	172	208	153	172
22	158	147	140	148	139	126	125	148	187	190	152	164
23	155	136	129	127	144	119	127	124	164	162	150	164
24	159	143	128	131	128	128	137	141	150	189	154	170
25	168	171	143	138	145	111	139	116	160	183	180	167
26	126	139	122	125	136	133	111	149	175	178	171	152
27	122	153	147	121	147	142	110	144	169	179	182	179
28	131	163	122	124	160	115	123	155	168	199	165	168
29	147	146	115	127	144	128	118	131	163	196	162	169
30	148		138	151	142	136	123	105	175	182	172	184
31	144		145		122		138	133		179		178
Sum	4,538	4,089	4,325	4,270	4,334	3,782	3,881	4,287	4,456	5,959	5,266	5,372

Current Year 1988									Period 1935-1988		
Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
	High	Low	High Day	High	Low Day	Low			Average	Maximum	Minimum
Jan.			25	168	27	122	146	8,996	9,287	12,131	* 2,123
Feb.			25	171	3	114	141	8,110	9,088	12,970	* 2,023
Mar.			6	174	29	115	140	8,581	10,267	13,704	* 2,322
Apr.			4	199	27	121	142	8,471	10,097	12,982	2,117
May			15	185	18	115	140	8,594	10,625	13,900	2,473
June			16	144	9	110	126	7,501	9,818	12,570	2,525
July			19	143	27	110	125	7,690	9,855	12,420	2,927
Aug.			21	164	30	105	138	8,499	9,771	12,657	2,989
Sept.			22	187	1	122	149	8,840	9,906	12,450	2,602
Oct.			3	228	23	162	192	11,812	10,786	13,898	3,444
Nov.			14	217	23	150	176	10,446	10,019	12,712	3,407
Dec.			18	204	!20	152	173	10,645	9,944	12,050	2,888
				228		105	149	108,185	119,463	149,010	31,840
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				6.46		2.97	4.22	133,444	147,355	183,801	39,274

ø Mean daily ! And other days * Partly estimated

09-5222.00 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder was located in Mexico on the right bank of the river about 1,000 feet (305 m) upstream from the southerly international boundary, 2 miles (3.2 km) west of San Luis, Arizona, and 21.9 miles (35.2 km) downstream from Morelos Dam. The zero of the gage was at mean sea level, U. S. C. & G. S. datum. This gage was destroyed on January 19, 1983. Between January 19, 1983 and December 10, 1985, temporary gages were installed on the United States side and levels were established to ensure continuous record. On December 10, 1985 a permanent water-stage recorder was relocated on the left bank of the river about 80 feet (24.4 m) upstream from the southerly international boundary.

RECORDS: Records obtained and furnished by the United States Section of the Commission. Computations by shifting control methods. Records available: Daily discharges, January 1950 through 1988; continuous record of gage heights, January 1947 through 1988. Monthly flows for this station have been derived for the period January 1935 through 1949 based on the computed records of monthly flows of the Colorado River at the northerly international boundary combined with the measured monthly flows from the wasteways discharging into the boundary section of the river from the Yuma Project in Arizona.

REMARKS: Reservoirs, diversions in the United States and Mexico, drainage returns, and waste flows modify the river flow at this station.

EXTREMES: Since January 1950: Maximum instantaneous discharge, 33,100 second-feet (937 m3/sec) on August 19, 1983; maximum gage height, 84.84 feet (25.86 m) on November 29, 1957. Minimum discharge, no flow on several occasions since September 1, 1956.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,650 "	1,460	444	* 195	28.1	1,540	" 1.8	0	222	0	0	" 0.9
2	4,760 "	699	133	* 195	29.4	266	" 1.6	0	90.7	0	0	0
3	5,600 "	1,560	197	* 195	28.8	45.6	" 1.6	0	52.8	0	0	0
4	6,350 "	1,820	108	* 195	* 26.9	* 18.2	" 1.5	0	28.3	0	0	0
5	6,050 *	2,380	93.6	* 238	* 25.7	" 16.9	" 1.1	0	14.2	0	0	* 24.8
6	5,360	3,650	88.4	358	* 24.7	" 16.2	" .3	0	7.0	0	0	* 13.3
7	5,390	4,130	93.1	232	* 24.1	* 15.5	" .2	0	5.8	0	0	" 1.8
8	6,490	3,550	82.5	192	* 23.7	" 14.9	" .1	0	4.4	0	0	" .3
9	7,210	2,660	75.2	186	* 23.8	" 13.9	" 0	0	3.3	0	0	" .3
10	7,660	1,890	283	180	25.0	" 13.3	" 0	0	2.1	0	0	" .3
11	8,430	1,790	172	183	28.6	" 12.8	0	0	.6	0	0	" .3
12	5,570	1,790	75.3	185	20.3	" 11.9	0	0	0	0	0	" .3
13	4,340	1,680	64.5	184	* 18.8	" 11.4	0	0	0	0	0	" .3
14	4,900	1,520	60.6	180	* 22.9	" 10.9	0	0	0	0	0	" .3
15	4,700	947	59.3	186	* 18.6	" 10.4	0	0	0	0	0	" .3
16	5,080	224	81.2	200	42.0	" 9.9	0	0	0	0	0	" .3
17	5,160	148	101	1,130	25.3	" 9.4	0	0	0	0	0	" .3
18	5,160	124	55.6	1,370	* 18.0	" 8.9	0	0	0	0	0	" .3
19	4,130	114	51.1	257	* 17.2	" 8.4	0	0	0	0	0	" .3
20	3,180	105	50.0	215	* 16.4	" 7.9	0	31.8	0	0	0	" .3
21	2,860	100	50.0	205	* 15.8	" 7.5	0	508	0	0	0	" .3
22	3,430	98.4	52.1	201	* 14.9	" 7.0	0	1,420	0	0	0	" .3
23	2,990	93.7	52.4	133	* 14.3	" 6.5	0	515	0	0	0	" .3
24	2,470	92.6	* 52.9	48.9	* 13.7	* 6.1	0	1,240	0	0	0	" 54.5
25	2,450	105	* 52.9	46.5	* 13.1	" 5.3	" .9	1,970	0	0	0	* 144
26	1,610	225	* 52.9	47.3	* 12.8	" 4.7	" 2.2	2,720	0	0	0	" 63.0
27	1,060	102	* 52.9	41.5	* 12.2	" 4.0	0	1,610	0	0	" .6	* 63.0
28	909	104	* 52.9	40.9	* 11.7	" 3.2	0	207 *	0	0	" 6.6	" 60.4
29	650	409	* 151	36.3	* 11.2	" 2.6	0	2,220 *	0	0	" 5.2	" 54.0
30	908		* 195	34.3	* 10.7	* 1.9	0	1,910	0	0	" 3.3	" 47.3
31	1,650		* 195		* 11.3		0	569		0		" 34.5
Sum	131,157	33,570.7	3,328.4	7,090.7	630.0	2,111.2	11.3	14,920.8	431.2	0	15.7	566.3

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1935-1988 Acre-Feet Average	Maximum	Minimum
Jan.	78.41	72.92	11	8,690	30	367	4,230	260,146	384,558	1,672,000	0
Feb.	76.38	71.70	8	4,260	!23	91.5	1,160	66,586	309,970	1,385,000	0
Mar.	73.24	71.35	1	772	!19	50.0	107	6,602	248,022	1,127,000	798
Apr.	74.52	71.09	18	2,150	30	32.0	236	14,064	164,540	758,202	0
May	71.43	* 70.88	16	53.7	31	10.2	20.3	1,250	232,568	1,160,000	0
June	74.32	" 70.45	1	1,910	30	" 1.8	70.4	4,188	203,178	1,180,000	0
July	" 70.56	70.37	26	" 4.0	! 8	0	.4	22.4	176,396	1,477,091	0
Aug.	75.64	70.37	29	3,080	! 1	0	481	29,595	189,784	1,705,190	0
Sept.	72.68	70.93	1	311	!11	0	14.4	855	211,972	1,586,380	0
Oct.	70.93	70.93		0		0	0	0	251,739	1,738,909	0
Nov.	" 71.27	70.93	28	" 7.2	! 1	0	.5	31.1	292,450	1,428,000	0
Dec.	73.40	70.93	25	307	! 1	0	18.3	1,123	358,313	1,839,000	0
	78.41	70.37		8,690		0	530	384,463	3,023,490	12,692,946	9,570

Yearly	Meters		Cubic Meters per Second			Thousands of Cubic Meters		
	23.90	21.45	246	0	15.0	474,227	3,729,414	15,656,495	11,804

! And other days " Estimated * Partly estimated

09-5222.01 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN FEET 1988

Day	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	" 76.77	74.13	72.75	72.05	71.04	73.90	" 70.45	70.37	72.39	70.93	70.93	70.99
2	" 76.83	73.38	71.86	72.05	71.06	72.13	" 70.44	70.37	71.81	70.93	70.93	70.93
3	" 77.24	74.28	72.16	72.05	71.06	71.32	" 70.44	70.37	71.62	70.93	70.93	70.93
4	" 77.57	74.58	71.75	72.05	* 71.04	* 71.04	" 70.43	70.37	71.49	70.93	70.93	70.93
5	* 77.44	75.09	71.66	72.17	* 71.03	" 71.01	" 70.43	70.37	71.36	70.93	70.93	71.68
6	77.13	76.07	71.62	72.51	* 71.02	" 70.99	" 70.42	70.37	71.25	70.93	70.93	71.49
7	77.15	76.32	71.68	72.16	* 71.02	* 70.97	" 70.42	70.37	71.19	70.93	70.93	71.03
8	77.62	75.87	71.60	72.03	* 71.01	" 70.95	" 70.41	70.37	71.14	70.93	70.93	70.98
9	77.90	75.15	71.55	72.01	* 71.02	" 70.93	" 70.39	70.37	71.08	70.93	70.93	70.98
10	78.07	74.42	72.30	71.97	71.05	" 70.91	" 70.38	70.37	71.03	70.93	70.93	70.98
11	78.33	74.31	72.09	71.98	71.11	" 70.89	70.37	70.37	70.98	70.93	70.93	70.98
12	77.17	74.33	71.59	71.98	70.96	" 70.87	70.37	70.37	70.93	70.93	70.93	70.98
13	76.60	74.20	71.49	71.98	70.92	* 70.85	70.37	70.37	70.93	70.93	70.93	70.98
14	76.90	74.00	71.47	71.96	* 71.01	" 70.83	70.37	70.37	70.93	70.93	70.93	70.98
15	76.80	73.45	71.46	71.97	* 70.92	" 70.81	70.37	70.37	70.93	70.93	70.93	70.98
16	76.99	72.37	71.61	72.03	71.29	" 70.79	70.37	70.37	70.93	70.93	70.93	70.98
17	77.03	72.08	71.80	73.28	71.05	" 70.77	70.37	70.37	70.93	70.93	70.93	70.98
18	77.03	71.97	71.41	73.65	* 70.90	" 70.74	70.37	70.37	70.93	70.93	70.93	70.98
19	76.46	71.91	71.36	72.21	* 70.89	" 70.72	70.37	70.37	70.93	70.93	70.93	70.98
20	75.84	71.85	71.35	72.07	* 70.88	" 70.70	70.37	70.76	70.93	70.93	70.93	70.98
21	75.60	71.83	71.35	72.04	* 70.88	" 70.68	70.37	73.11	70.93	70.93	70.93	70.98
22	76.02	71.81	71.38	72.02	* 70.88	" 70.66	70.37	74.18	70.93	70.93	70.93	70.98
23	75.68	71.78	71.38	71.73	* 70.88	" 70.64	70.37	73.18	70.93	70.93	70.93	70.98
24	75.26	71.75	* 71.39	72.28	* 70.88	* 70.62	70.37	73.92	70.93	70.93	70.93	71.53
25	75.23	71.79	* 71.39	71.26	* 70.88	" 70.59	" 70.42	74.71	70.93	70.93	70.93	72.78
26	74.33	72.27	* 71.39	71.26	* 70.88	" 70.56	" 70.48	75.42	70.93	70.93	70.96	72.13
27	73.77	71.74	* 74.39	71.20	* 70.88	" 70.54	70.37	74.28	70.93	70.93	70.93	72.04
28	73.63	71.73	* 71.39	71.19	* 70.88	" 70.51	70.37	* 72.29	70.93	70.93	71.24	72.01
29	73.36	72.45	* 71.89	71.14	* 70.88	" 70.48	70.37	* 74.75	70.93	70.93	71.17	71.93
30	73.55		* 72.05	71.12	* 70.88	* 70.46	70.37	74.50	70.93	70.93	71.08	71.85
31	74.37		* 72.05		* 70.92		70.37	73.06		70.93		71.70
Avg.	76.25	73.34	71.66	71.95	70.97	70.93	70.39	71.65	71.10	70.93	70.95	71.28

* Partly Estimated "Estimated

09-5333.00 WELLTON-MOHAWK BYPASS DRAIN AT SOUTHERLY INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and Parshall flume located 80 feet (24.4 m) upstream from the southerly land boundary, 550 feet (168 m) east of the Colorado River, and 1.8 miles (2.9 km) west of San Luis, Arizona. The zero of the gage has not been determined.
RECORDS: Based on current meter measurements and a continuous record of gage heights. Station is operated by United States Section of the Commission. Records available: June 23, 1977 through 1988.
REMARKS: Pursuant to Minute No. 242 of the Commission, a bypass drain of the Wellton-Mohawk extension channel was constructed from Morelos Dam to the Santa Clara Slough in Mexico along the left bank of the Colorado River.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	95.7	109	167	0.1	171	177	162	183	228	210	209	205
2	96.1	109	168	.1	168	180	167	189	218	208	210	212
3	96.4	110	165	.1	171	178	169	190	215	207	211	209
4	97.0	111	169	.1	172	176	168	193	227	209	209	206
5	97.3	115	167	.1	173	176	162	193	224	211	202	204
6	99.5	138	167	.1	166	175	158	202	217	207	212	201
7	98.3	149	170	0	163	170	163	208	226	205	209	215
8	97.3	149	166	.1	157	168	160	211	240	203	211	211
9	98.0	149	166	0	153	162	164	210	242	201	213	206
10	98.7	150	158	0	154	155	167	210	242	202	221	206
11	102	150	162	0	153	162	169	208	241	201	215	202
12	93.7	156	166	0	156	161	167	206	241	203	212	202
13	93.7	159	170	0	156	161	158	213	237	201	217	205
14	103	156	171	0	157	159	171	214	229	201	217	204
15	100	158	173	0	159	163	188	212	229	202	214	204
16	99.2	159	172	0	161	154	149	211	231	202	198	207
17	91.8	156	171	0	170	139	55.6	207	232	202	195	202
18	93.1	158	172	0	181	143	43.5	209	234	202	190	201
19	90.4	157	172	0	177	149	17.0	207	236	203	197	197
20	86.8	158	173	0	174	148	3.4	208	237	204	212	198
21	84.7	155	171	0	172	158	54.5	198	225	204	217	198
22	91.6	154	171	6.3	172	153	157	204	190	204	217	195
23	103	153	167	169	173	154	175	206	214	204	215	200
24	103	158	162	179	175	159	191	216	204	204	215	202
25	102	168	162	180	173	164	187	205	207	204	217	204
26	98.0	175	169	176	172	171	185	203	208	204	215	202
27	97.0	176	165	176	175	169	187	214	208	204	215	200
28	101	167	133	178	174	162	186	226	212	205	210	198
29	103	168	2.0	171	174	161	181	221	210	206	207	208
30	109		.6	172	173	162	178	221	206	206	200	206
31	109		.2		175		180	223		205		210
Sum	3,029.3	4,330	4,667.8	1,408.0	5,200	4,869	4,623.0	6,421	6,710	6,334	6,302	6,320

Month	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Period 1977-1988 Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	1.32	1.09	!30	110	21	83.2	97.7	6,009	12,116	17,542	6,009
Feb.	1.75	1.30	!26	183	! 1	107	149	8,588	11,271	14,896	6,896
Mar.	1.71	.01	!16	176	31	0	151	9,258	12,852	17,427	9,258
Apr.	1.73	0	25	183	! 1	0	46.9	2,793	11,983	16,711	2,793
May	1.69	1.51	18	185	! 9	151	168	10,314	12,606	16,808	4,228
June	1.69	1.43	3	185	17	135	162	9,658	12,145	16,086	9,281
July	1.82	.10	24	191	21	.8	149	9,170	12,673	18,026	8,333
Aug.	2.02	1.76	31	230	1	179	207	12,736	12,922	18,196	8,656
Sept.	2.09	1.69	! 8	243	22	173	224	13,309	11,431	19,083	41.7
Oct.	1.92	1.83	5	215	9	199	204	12,563	11,973	19,133	19.4
Nov.	1.99	1.78	10	226	30	185	210	12,500	11,191	16,980	48.0
Dec.	2.02	1.78	2	228	6	185	204	12,536	11,985	18,256	6,216
Yearly	2.09	0		243		0	165	119,434	145,148	180,374	97,641
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.64	0		6.88		0	4.67	147,319	179,037	222,488	120,438

Current Year 1988

! And other days

09-5350.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 27 IN MEXICO

DESCRIPTION: Water-stage recorder and cableway located on the left bank of the canal wasteway immediately upstream from where it discharges into the Colorado River, 0.6 mile (1.0 km) downstream from the wasteway gates on the Central Feeder Canal on the right bank of the Colorado River, 16.8 miles (27.0 km) downstream from Morelos Dam, and 820 feet (250 m) south of the junction of the Mexicali-San Luis and Algodones-Pescaderos highways.

RECORDS: Data obtained and computed by the Colorado River Irrigation District of the Ministry of Agriculture and Hydraulic Resources and furnished by the Mexican Section of the Commission. Records shown in table below are waste returns to the Colorado River. Records available: April 1956 through 1988.

REMARKS: The Colorado River Irrigation District transports water for irrigation of land on the left bank of the Colorado River by the Central Feeder Canal to a point called Kilometer 27. At this point, flows may be returned to the river through the wasteway or diverted to the Bacanora-Monumentos Canal system through the Sanchez Mejorada Siphon, which was placed in operation on June 28, 1963. As part of the rehabilitation works, started in 1968, of the Colorado River Irrigation District, the Canal de Conexion was enlarged and lined, and is now known as the Central Feeder Canal.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1956-1988		
		Average	Maximum	Minimum
January	3,288	10,363	69,527	0
February	3,812	4,896	41,264	0
March	597	7,364	58,411	0
April	399	12,746	69,212	0
May	66.6	11,951	80,727	0
June	106	10,217	50,025	0
July	3.5	11,747	46,139	0
August	1,347	15,850	107,162	0
September	52.5	13,033	68,053	0
October	361	11,886	110,417	0
November	128	11,143	99,044	0
December	571	9,966	70,213	0
Yearly	10,732	126,377	509,407	0
	Thousands of Cubic Meters			
	13,238	155,884	628,347	0

09-5365.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 38 IN MEXICO

DESCRIPTION: Wasteway to the Colorado River on the left bank of new Barrote Canal at old dam and bridge at Kilometer 18+251 (old Kilometer 38+000). The wasteway is located in the Colonia Bojorquez 0.8 mile (1.3 km) upstream from the Sonora-Baja California railroad bridge, 3.7 miles (5.9 km) downstream from the Miguel C. Rodriguez gaging station, and 28.1 miles (45.3 km) downstream from the southerly international boundary.
RECORDS: The records are computed by the Ministry of Agriculture and Hydraulic Resources and based upon gate openings. Records available: January 1964 through 1988.
REMARKS: The wasteway structure on the left bank of the Colorado River has two manually operated radial gates 9.8 feet (3.0 m) wide. It discharges into a dirt canal 656 feet (200 m) long with a total capacity of 459 second-feet (13.0 m3/sec) which discharges to the river.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1964-1988		
		Average	Maximum	Minimum
January	229	1,800	8,546	0
February	86.7	1,419	9,757	0
March	4.9	741	4,809	0
April	5.6	395	4,503	0
May	0	1,463	11,549	0
June	0	843	6,960	0
July	0	707	7,389	0
August	55.4	1,147	14,402	0
September	0	2,229	13,665	0
October	0	4,575	23,242	0
November	0	2,850	20,481	0
December	2.8	2,362	10,847	0
Yearly	384	20,530	83,688	0
	Thousands of Cubic Meters			
	474	25,324	103,228	0

STORED WATER IN LARGE RESERVOIRS OF THE COLORADO RIVER

Data are presented below for all large storage reservoirs in the Colorado River basin below Lee's Ferry, all of which are located in the United States. The monthly figures represent usable contents on the last day of the month, in thousands of acre-feet. The capacities indicated are usable capacities at the top of the spillway gates in closed position for those dams having controlled spillways; for all others, capacities indicated are at spillway level. Records furnished by the U.S. Geological Survey.

IN THOUSANDS OF ACRE-FEET

Month	LAKE MEAD (Capacity 26,159.0)		LAKE MOHAVE (Capacity 1,810.0)		HAVASU LAKE (Capacity 619.4)		TOTAL IN UNITED STATES RESERVOIRS (Capacity 28,588.4)	
	1988	Average 1935-1988	1988	Average 1951-1988	1988	Average 1939-1988	1988	Estimated Average
Jan.	24,574	18,259	1,636	1,659	545.9	553.6	26,755.9	20,471.6
Feb.	24,655	18,087	1,762	1,677	544.5	555.7	26,961.5	20,319.7
Mar.	24,509	17,836	1,687	1,677	557.7	569.6	26,753.7	20,082.6
Apr.	24,150	17,899	1,775	1,673	615.4	600.0	26,540.4	20,172.0
May	23,831	18,637	1,754	1,729	603.0	602.9	26,188.0	20,968.9
June	23,380	19,709	1,697	1,633	605.6	600.8	25,682.6	21,942.8
July	23,124	19,866	1,476	1,510	577.7	590.0	25,177.7	21,966.0
Aug.	22,854	19,675	1,516	1,462	570.5	574.2	24,940.5	21,711.2
Sept.	22,795	19,449	1,506	1,434	564.6	569.7	24,865.6	21,452.7
Oct.	22,793	19,233	1,499	1,445	546.3	568.7	24,838.3	21,246.7
Nov.	22,838	19,071	1,531	1,514	542.9	559.2	24,911.9	21,144.2
Dec.	22,880	18,888	1,594	1,594	552.8	557.4	25,026.8	21,039.4
Avg.	23,532	18,884	1,619	1,584	568.9	575.2	25,719.9	21,043.2
Max.	24,655	! 27,780	1,775	! 1,808	615.4	! 688.7	26,961.5	! 29,132.3
Min.	22,793	* 10,727	1,476	!! 1,186	542.9	!! 76.9	24,838.3	!! 13,062.6

! Maximum end of month storage for period of record
!! Minimum end of month storage for period of record
* Minimum end of month storage since 1940

SUSPENDED SILT - 1988

The following tables are based on determinations of gravimetric percentages of dry silt in water samples taken at each station by one of the following methods.

A. By lowering a D-43 depth integrating sampler at verticals located at centers of sections of equal discharge in the river cross section, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

B. By lowering a D-43 depth integrating sampler at verticals located at centers of each span of the service bridge across the Alamo Canal, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

C. By sampling at the stream surface with a separate bottle at each of three points, spaced 1/6, 1/2, and 5/6 of the stream width. The gravimetric percentage in each sample is determined, a coefficient of 1.10 is applied to the average of the three, and the product applied to the volume of the stream flow represented by that set of samples.

For ease of comparison, the assumption is made that 1,847 tons of deposited silt would occupy a volume of one acre-foot, or one cubic foot of deposited silt would weigh 85 pounds.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent
Jan. 6	0827	7,240	0.0504	May 4	0730	1,810	0.0016	Sep. 7	0815	2,370	0.0030
13	0824	6,770	0.0093	11	0755	2,060	0.0014	15	0800	2,120	0.0031
20	0830	5,400	0.0018	18	0728	1,850	0.0025	21	0750	1,610	0.0026
27	0825	3,550	0.0017	24	0730	1,760	0.0023	28	0745	1,680	0.0021
Feb. 3	0823	5,160	0.0014	June 2	0740	2,270	0.0016	Oct. 5	0731	1,500	0.0018
10	0827	4,580	0.0012	8	0740	2,010	0.0018	12	0740	796	0.0028
17	0828	3,100	0.0020	15	0800	2,570	0.0021	19	0750	1,150	0.0016
24	0835	2,340	0.0011	22	0725	3,030	0.0027	26	0750	1,580	0.0021
Mar. 2	0820	3,530	0.0021	29	0730	3,140	0.0017	Nov. 2	0750	1,510	0.0019
9	0837	3,300	0.0018	July 6	0728	3,060	0.0022	9	0728	1,030	0.0027
16	0840	3,600	0.0023	13	0725	3,520	0.0021	16	0816	1,530	0.0014
23	0730	4,130	0.0027	20	0730	3,470	0.0023	23	0805	1,440	0.0026
30	0825	4,150	0.0013	27	0730	3,790	0.0021	30	0752	1,690	0.0034
Apr. 6	0750	4,060	0.0021	Aug. 3	0735	3,970	0.0019	Dec. 7	0755	2,000	0.0018
13	0725	3,960	0.0020	10	0720	3,750	0.0017	14	0842	1,840	0.0022
20	0735	3,620	0.0014	17	0730	3,930	0.0091	21	0906	1,710	0.0051
27	0745	3,060	0.0021	24	0710	4,600	0.0049	29	0853	1,780	0.0018
				31	0745	3,250	0.0050				

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

Month	Tons		Number of Samples	Gravimetric Percentages			Acre-Feet at 1,847 Tons/Ac.Ft.	1952-1988 Period of Record		
	Water	Silt		Average	Maximum Sample	Minimum Sample		Average	Maximum	Minimum
Jan.	210,944,200	17,985	4	0.0085	0.0200	0.0033	9.7	9.0	50.8	0.2
Feb.	251,248,600	8,084	4	.0032	.0055	.0020	4.4	9.6	59.8	.9
Mar.	305,860,400	11,632	5	.0038	.0044	.0017	6.3	40.3	154	5.3
Apr.	295,103,900	9,782	4	.0033	.0041	.0021	5.3	39.9	236.6	5.3
May	159,855,800	5,260	4	.0033	.0046	.0023	2.8	12.0	61.8	1.5
June	205,528,000	6,635	5	.0032	.0051	.0022	3.6	26.5	108.6	2.3
July	285,860,200	12,758	4	.0045	.0060	.0028	6.9	36.8	155.9	3.9
Aug.	316,340,300	20,275	5	.0064	.0126	.0039	10.9	35.2	135.3	3.8
Sept.	138,922,500	3,715	4	.0027	.0111	.0007	2.0	15.6	'64.7	1.9
Oct.	115,333,900	4,268	4	.0037	.0070	.0011	2.3	5.4	48.2	.3
Nov.	116,981,000	2,812	5	.0024	.0046	.0009	1.5	4.9	54.9	.2
Dec.	162,492,300	8,202	4	.0050	.0084	.0008	4.4	7.2	23.7	1.1
Yearly	2,564,471,100	111,408	52	0.0043	0.0200	0.0007	60.2	242.2	809.0	51.4

Samples and analyses by Mexican Section, Method B

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent	Date	Time Std.	Stream-flow, Momen-tary Sec.-Ft.	Gravimetric Percent
Jan. 5	1305	6,050	0.0281	Apr. 19	1146	253	0.0019				
Feb 9	1310	2,640	0.0211	May 10	1138	23.2	0.0014				
Mar. 1	1020	478	0.0029	June 2	1055	192	0.0011				

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

CHEMICAL ANALYSES OF WATER SAMPLES

1988

The tables below are based on chemical analyses of samples from the Colorado River at the Northerly International Boundary taken by the United States Section of the Commission and analyzed under a contract with the U. S. Bureau of Reclamation.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

1988 Date	Time Std.	Streamflow Momentary Sec.-Ft.	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO3) mg/L	Hardness Noncarbonate (as CaCO3) mg/L	Calcium ion (Ca), Dissolved mg/L	Magnesium ion (Mg) Dissolved mg/L
Jan. 4	0830	8,730	969	8.3	303	167	74.9	28.4
19	0800	6,200	1,050	8.3	310	167	75.1	30.0
Feb. 1	0830	4,230	1,210	8.3	330	178	80.1	31.7
16	0830	3,370	1,200	8.3	336	183	83.6	31.1
Mar. 7	0830	2,940	1,260	8.4	351	192	86.8	32.9
21	0830	3,790	1,090	8.3	318	174	74.9	32.1
Apr. 4	0830	3,740	1,080	8.3	320	176	79.9	29.4
18	0800	4,130	1,070	8.3	319	175	78.3	30.3
May 2	0800	2,690	1,230	8.3	342	188	89.2	29.1
16	0715	1,900	1,280	8.4	340	182	86.1	30.6
June 6	0730	2,030	1,360	8.4	366	200	90.0	34.4
20	0930	2,930	1,160	8.4	339	187	81.0	33.5
July 5	0730	3,060	1,170	8.3	307	154	74.5	29.6
18	0745	3,450	1,120	8.3	297	148	74.4	27.1
Aug. 1	0730	4,020	1,080	8.3	296	152	75.3	26.5
15	0730	3,650	1,100	8.3	317	171	78.8	29.4
Sep. 6	0730	2,490	1,180	8.3	308	237	73.7	30.2
19	0715	1,770	1,270	8.2	334	259	82.3	31.3
Oct. 3	0830	1,490	1,430	8.3	356	189	89.1	32.7
17	0730	1,090	1,500	#	335	163	86.8	29.0
Nov. 7	0730	1,350	1,460	8.2	364	152	91.1	33.3
21	0800	1,650	1,420	8.0	385	213	97.5	34.7
Dec. 5	0800	1,140	1,400	8.3	368	200	87.6	36.4
19	0815	1,560	1,430	8.1	394	222	98.8	35.9

1988 Date	Sodium ion (Na) Dissolved mg/L	Potassium ion (K) Dissolved mg/L	Sulfate ion (SO4) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Carbonate (as CO3) mg/L	Bicarbonate (as HCO3) mg/L	Nitrate (as NO3) mg/L	Solids Dissolved (Calculated)
Jan. 4	87.1	5.4	243	79.5	0	166	1.0	613
19	104	3.7	262	94.9	0	175	.9	668
Feb. 1	127	3.9	289	123	0	185	.9	759
16	132	4.0	282	124	0	186	1.0	762
Mar. 7	131	3.8	295	137	0	194	1.3	795
21	101	3.8	268	99.3	0	176	1.2	678
Apr. 4	105	3.7	266	99.2	0	176	1.2	682
18	108	4.0	253	99.0	0	176	1.2	671
May 2	132	4.3	290	122	0	188	1.8	773
16	139	4.3	302	134	0	193	1.8	805
June 6	155	4.4	302	146	1.0	202	1.1	848
20	120	3.9	277	112	0	185	1.3	734
July 5	119	3.9	285	116	1.0	186	1.2	736
18	115	3.8	275	103	0	182	1.0	702
Aug. 1	108	3.8	275	103	0	176	1.1	692
15	119	3.6	302	109	0	178	1.0	744
Sep. 6	132	4.1	289	119	0	87.0	.8	706
19	137	4.4	300	137	0	92.0	.9	754
Oct. 3	167	4.3	325	164	0	204	1.3	901
17	170	4.0	338	173	0	210	1.2	921
Nov. 7	164	4.8	326	169	0	259	1.4	934
21	155	4.0	349	157	0	210	1.1	916
Dec. 5	147	4.0	315	160	1.0	205	.9	868
Dec. 19	172	4.0	335	173	0	210	1.3	938

Missing record

SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following tables show specific conductance of individual water samples taken at Colorado River stations and in Mexican canals. Samples were taken at the northerly international boundary by both Sections of the Commission and at the southerly international boundary by the United States Section. Determinations for the northerly international boundary were made by the Bureau of Reclamation; and for the southerly international boundary, by the United States Section of the Commission. Samples for the Intake Canal at Morelos Dam were taken by the Mexican Section of the Commission, and determinations were made by the Ministry of Agriculture and Hydraulic Resources of Mexico. No samples were taken at the Miguel C. Rodriguez gaging station.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1988

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	* 1,030	1,210	1,140	1,060	* 1,180	1,080	1,100	1,080	1,230	* 1,430	1,590	1,350
2	* 1,020	1,230	1,140	* 1,070	1,230	1,180	* 1,120	1,050	1,300	* 1,430	1,420	1,380
3	* 995	1,160	1,140	* 1,070	1,300	1,230	* 1,130	1,050	* 1,270	1,430	1,400	* 1,390
4	969	1,160	1,130	1,080	1,300	* 1,270	* 1,140	1,060	* 1,250	1,420	1,480	* 1,390
5	977	1,150	* 1,170	1,010	1,300	* 1,320	1,170	1,070	* 1,220	1,340	* 1,470	1,400
6	993	* 1,120	* 1,210	1,050	1,230	1,360	1,140	* 1,090	1,180	1,360	* 1,460	1,310
7	968	* 1,110	1,260	1,070	* 1,230	1,320	1,120	* 1,110	1,160	1,460	1,460	1,280
8	936	1,100	1,220	1,080	* 1,230	1,290	1,110	1,120	1,240	* 1,480	1,560	1,450
9	* 930	1,110	1,150	* 1,080	1,230	1,260	* 1,110	1,090	1,330	* 1,500	1,570	1,380
10	* 924	1,110	1,100	* 1,080	1,200	1,290	* 1,110	1,070	* 1,320	* 1,520	1,460	* 1,370
11	927	1,090	1,160	1,080	1,230	* 1,280	1,110	1,090	* 1,320	1,540	* 1,470	* 1,350
12	1,070	1,080	* 1,160	1,080	1,180	* 1,280	1,080	1,090	1,310	1,590	* 1,490	1,340
13	991	* 1,090	* 1,160	1,090	1,210	1,270	1,100	* 1,100	1,450	1,600	* 1,500	1,350
14	989	* 1,090	1,160	1,090	* 1,230	1,200	1,110	* 1,110	1,390	1,420	1,510	1,370
15	991	* 1,140	1,080	1,080	* 1,250	1,170	1,080	1,100	1,180	* 1,440	1,470	1,330
16	* 1,000	1,190	1,060	* 1,080	1,280	1,170	* 1,090	1,100	1,230	* 1,460	1,470	1,370
17	* 1,010	1,200	1,060	* 1,070	1,350	1,180	* 1,110	1,080	* 1,250	1,500	1,520	* 1,390
18	* 1,030	1,220	1,110	1,070	1,340	* 1,170	1,120	1,110	* 1,260	1,360	1,390	* 1,410
19	1,050	1,260	* 1,100	1,110	1,250	* 1,170	1,160	1,120	1,270	1,430	* 1,400	1,430
20	1,100	* 1,240	* 1,090	1,140	1,260	1,160	1,160	* 1,100	1,330	1,370	* 1,410	1,390
21	1,070	* 1,230	1,080	1,130	* 1,270	1,110	1,090	* 1,070	1,370	1,240	1,420	1,430
22	1,030	1,220	1,050	1,140	* 1,290	1,100	1,090	1,050	1,280	* 1,320	1,500	1,270
23	* 1,080	1,210	1,040	* 1,190	1,300	1,100	* 1,090	1,030	1,400	* 1,410	1,520	1,250
24	* 1,100	1,270	1,040	* 1,250	1,250	1,110	* 1,080	1,020	* 1,390	1,490	* 1,500	* 1,290
25	1,160	1,120	1,060	1,300	1,330	* 1,150	1,080	1,000	* 1,370	1,400	1,470	* 1,320
26	1,230	1,200	* 1,060	1,180	1,300	* 1,180	1,130	1,030	1,360	1,460	* 1,420	* 1,360
27	1,210	* 1,180	* 1,050	1,150	1,360	1,220	1,090	* 1,040	1,390	1,400	* 1,370	1,390
28	1,220	* 1,170	1,050	1,130	* 1,340	1,170	1,090	* 1,040	1,320	1,550	1,320	1,390
29	1,240	1,160	1,020	1,100	* 1,310	1,120	1,090	1,050	1,300	* 1,560	1,440	1,370
30	* 1,230		1,040	* 1,140	* 1,280	1,090	* 1,090	1,070	1,430	* 1,570	1,430	1,400
31	* 1,220		1,050		1,260		* 1,080	1,120		1,580		* 1,410

* Estimated

SPECIFIC CONDUCTANCE OF WATER SAMPLES

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1988

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	#1,150	1,230	1,270	1,170	*1,260	1,060	1,170	1,090	1,240	1,490	1,460	1,390
2	-	1,150	1,270	1,070	1,280	1,060	1,210	890	1,250	1,460	1,470	1,440
3	#1,150	1,160	1,200	1,020	1,280	1,280	1,210	1,020	1,170	1,460	1,420	1,400
4	-	1,200	1,220	1,030	*1,280	1,280	1,220	1,100	1,180	1,410	1,620	1,390
5	# 985	1,160	1,210	1,140	1,280	1,280	1,110	1,090	1,110	1,350	1,600	1,370
6	# 983	1,180	1,230	1,140	1,230	1,340	1,210	1,020	1,120	1,420	1,600	1,390
7	# 996	1,180	1,200	1,160	1,300	1,340	1,110	1,050	1,180	1,410	1,610	1,400
8	-	1,160	1,090	1,180	1,270	1,260	1,200	1,080	1,210	1,410	1,610	1,340
9	-	1,180	1,100	1,180	*1,260	1,250	1,180	1,000	1,320	1,410	1,610	1,290
10	# 997	1,160	1,140	1,180	1,240	1,250	1,120	1,080	1,330	1,520	*1,500	1,420
11	-	1,130	1,170	1,080	1,170	1,250	1,140	1,100	1,380	1,390	1,390	1,290
12	#1,040	1,090	1,170	1,180	1,300	1,250	1,110	1,100	1,300	1,180	1,410	1,290
13	#1,070	1,170	1,170	1,180	1,270	1,260	1,070	1,150	1,380	1,590	1,410	1,340
14	# 998	1,180	1,170	1,190	1,330	1,260	1,150	1,100	1,320	1,490	1,390	1,360
15	-	1,200	1,090	1,140	1,320	1,180	1,150	1,000	1,310	1,530	1,360	1,400
16	-	1,210	1,030	1,140	1,340	1,190	1,080	1,000	1,310	1,530	1,420	1,290
17	-	1,180	1,190	1,180	1,320	971	1,050	1,050	1,360	1,420	1,380	1,430
18	1,110	1,260	1,200	1,170	1,360	969	1,010	1,090	1,390	1,410	1,380	1,310
19	1,100	1,240	1,180	1,170	1,330	969	1,120	1,020	1,250	1,520	1,520	1,430
20	1,080	1,280	1,060	1,090	1,340	963	1,130	1,020	1,300	1,380	1,540	1,400
21	# 935	1,270	1,060	1,190	1,330	962	1,120	1,020	1,360	1,360	1,540	1,440
22	# 916	1,260	1,060	1,220	*1,340	945	1,100	1,000	1,460	1,620	1,540	1,310
23	# 937	1,250	1,150	1,230	*1,350	1,130	1,120	1,000	1,460	1,560	1,520	1,260
24	-	1,230	1,120	1,230	1,350	1,180	1,080	1,020	1,360	1,630	1,400	1,510
25	-	1,250	1,130	1,230	1,350	1,250	1,040	1,020	1,360	1,610	1,410	1,310
26	-	1,260	1,130	1,230	1,300	1,250	1,100	1,060	1,380	1,610	1,310	1,400
27	1,220	1,280	1,080	1,070	1,110	1,140	1,020	1,070	1,450	1,420	1,540	1,480
28	1,290	1,260	1,100	1,080	1,110	1,220	1,100	1,040	1,390	1,480	1,430	1,400
29	1,290	1,270	1,110	1,150	1,120	1,170	1,100	1,170	1,350	1,430	1,440	1,390
30	1,200		1,040	1,230	1,110	1,170	1,090	1,080	1,500	1,480	1,430	1,380
31	1,240		1,130		1,070		1,100	1,140		1,480		1,380

* Estimated
\# Data supplied by Ministry of Agriculture and Hydraulic Resources of Mexico

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1988

January	February	April	May	June	August	December
5 1,040	26 1,200	5 3,450	3 1,730	21 1,700	26 1,060	5 1,710
21 1,130	March	19 1,810	June	July	September	
	1 1,270		7 1,550	5 1,660	6 1,480	

RAINFALL ON THE COLORADO RIVER WATERSHED
IN INCHES

Tabulated below are monthly records of rainfall at stations located in California and Arizona in the United States and in Baja California and Sonora in Mexico, with averages for their periods of record. Records of daily rainfall amounts, where available, are on file in the offices of the United States or Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listings of these stations on following page in this bulletin.

IN THE UNITED STATES

Month	Brawley, California		El Centro, California		Blythe, California		Yuma Citrus Station, Arizona		Bullhead City, Arizona	
	1988	Average 1931-1988	1988	Average 1931-1988	1988	Average 1931-1988	1988	Average 1931-1988	1988	Average 1978-1988
Jan.	0.16	0.34	1.30	0.38	0.80	0.43	0.23	0.40	0.89	1.06
Feb.	.52	.34	.08	.35	.74	.42	.03	.34	.79	.78
Mar.	.01	.23	0	.21	0	.40	.05	.26	.03	1.02
Apr.	.22	.09	.11	.09	.81	.14	1.01	.13	1.93	.30
May	0	.02	0	.01	0	.03	0	.02	T	.14
June	0	.01	0	.01	0	.03	.37	.03	T	.01
July	0	.06	0	.09	0	.19	T	.19	.17	.50
Aug.	.52	.38	.72	.36	1.11	.79	.45	.56	3.39	1.26
Sep.	0	.33	0	.29	0	.39	0	.35	0	.58
Oct.	T	.27	0	.29	.06	.30	.23	.39	.05	.39
Nov.	0	.19	0	.19	0	.29	0	.20	.04	.71
Dec.	0	.43	0	.45	T	.54	T	.43	.10	.92
Yearly	1.43	2.69	2.21	2.72	3.52	3.95	2.37	3.30	7.39	7.67

IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		San Luis, R. C., Sonora		Delta, Baja California	
	1988	Average 1948-1987	1988	Average 1926-1988	1988	Average 1948-1988	1988	Average 1949-1988	1988	Average 1948-1988
Jan.	#	0.39	0.08	0.35	0.39	0.35	0.08	0.31	0.16	0.35
Feb.	#	.24	.55	.31	.04	.20	0	.28	T	.28
Mar.	#	.16	.08	.24	0	.12	0	.24	T	.16
Apr.	#	.08	.08	.08	.12	.12	.08	.04	.24	.08
May	#	T	0	T	0	T	0	.04	0	T
June	#	T	0	T	0	.04	0	.04	0	T
July	#	.12	0	.16	.08	.08	0	.20	.04	.08
Aug.	#	.39	1.34	.39	.16	.24	0	.43	.71	.28
Sept.	#	.20	0	.39	0	.12	0	.24	0	.24
Oct.	#	.28	.08	.31	.28	.28	.83	.35	.16	.31
Nov.	#	.16	0	.16	0	.16	0	.39	0	.12
Dec.	#	.39	0	.71	0	.28	0	.63	.16	.43
Yearly	-	2.44	2.20	3.15	1.06	1.97	0.98	2.83	1.46	2.17

Month	Colonia Juarez, Baja California		Laguna Salada, Baja California		Riito, Sonora		San Felipe, Baja California		El Centinela, Baja California	
	1988	Average 1952-1988	1988	Average 1975-1987	1988	Average 1959-1988	1988	Average 1969-1988	1988	Average 1978-1988
Jan.	0.16	0.47	#	0.28	0.08	0.28	.16	0.31	0	0.24
Feb.	0	.28	#	.39	0	.24	0	.16	.04	.24
Mar.	0	.28	#	.08	0	.16	0	.12	0	.20
Apr.	.20	.08	#	.08	.12	.04	#	.04	0	0
May.	0	.04	#	.04	0	T	0	.04	0	0
June	0	T	#	0	0	.04	#	.04	0	0
July	.28	.20	#	.16	0	.12	0	.16	0	T
Aug	.79	.35	#	.63	.24	.28	0	.43	T	.31
Sept.	0	.28	#	.63	0	.43	0	.35	0	.04
Oct.	#	.43	#	.28	0	.35	0	.24	0	.28
Nov.	0	.24	#	.12	0	.20	0	.20	0	.04
Dec.	0	.43	#	.79	0	.39	0	.43	0	.43
Yearly	-	2.44	-	4.76	0.43	2.72	-	2.72	0.04	1.93

T Trace # Missing record

LOCATION OF RAINFALL STATIONS ON THE COLORADO RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1988.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
* Blythe, California	33° 37'	114° 36'	268	1909	State Division of Forestry
Brawley, California	32° 57'	115° 33'	100	1908	Agricultural Research Service
Bullhead City, Arizona	35° 07'	114° 36'	580	1980	Bullhead City Fire Department
El Centro, California	32° 46'	115° 34'	30	1930	El Centro Water Department
Yuma Citrus Station, Arizona	32° 37'	114° 39'	191	1923	University of Arizona Experimental Farm

IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
Bataques, Baja California	32° 34'	115° 00'	** 66	1948	# S. A. R. H.
Colonia Juarez, Baja California	32° 18'	115° 05'	49	1952	S. A. R. H.
Delta, Baja California	32° 21'	115° 11'	** 39	1948	S. A. R. H.
El Centinela, Baja California	32° 35'	115° 45'	164	1978	S. A. R. H.
Laguna Salada, Baja California	32° 12'	115° 44'	7	1975	S. A. R. H.
Los Algodones, Baja California	32° 42'	114° 44'	115	1948	S. A. R. H.
Mexicali, Baja California	32° 40'	115° 28'	13	1926	S. A. R. H.
Riito, Sonora	32° 13'	115° 01'	43	1959	S. A. R. H.
San Felipe, Baja California	31° 01'	114° 51'	72	1969	S. A. R. H.
San Luis, R. C., Sonora	32° 28'	114° 51'	131	1949	S. A. R. H.

* Not shown on map
δ Elevation above mean sea level except Brawley and El Centro, which are elevations below mean sea level
** Elevations obtained from International Boundary and Water Commission topographic maps
\# Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE COLORADO RIVER BASIN
IN INCHES

Tabulated below are records of evaporation observed at one station in Arizona and at nine stations in Baja California and Sonora, Mexico. The station in the United States is operated by the University of Arizona Experimental Farm. The stations in Mexico are operated by the Ministry of Agriculture and Hydraulic Resources. The type of pan used at all these stations was the National Weather Service standard pan of 4-foot diameter. For specific location of these stations, refer to data opposite the same station name shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

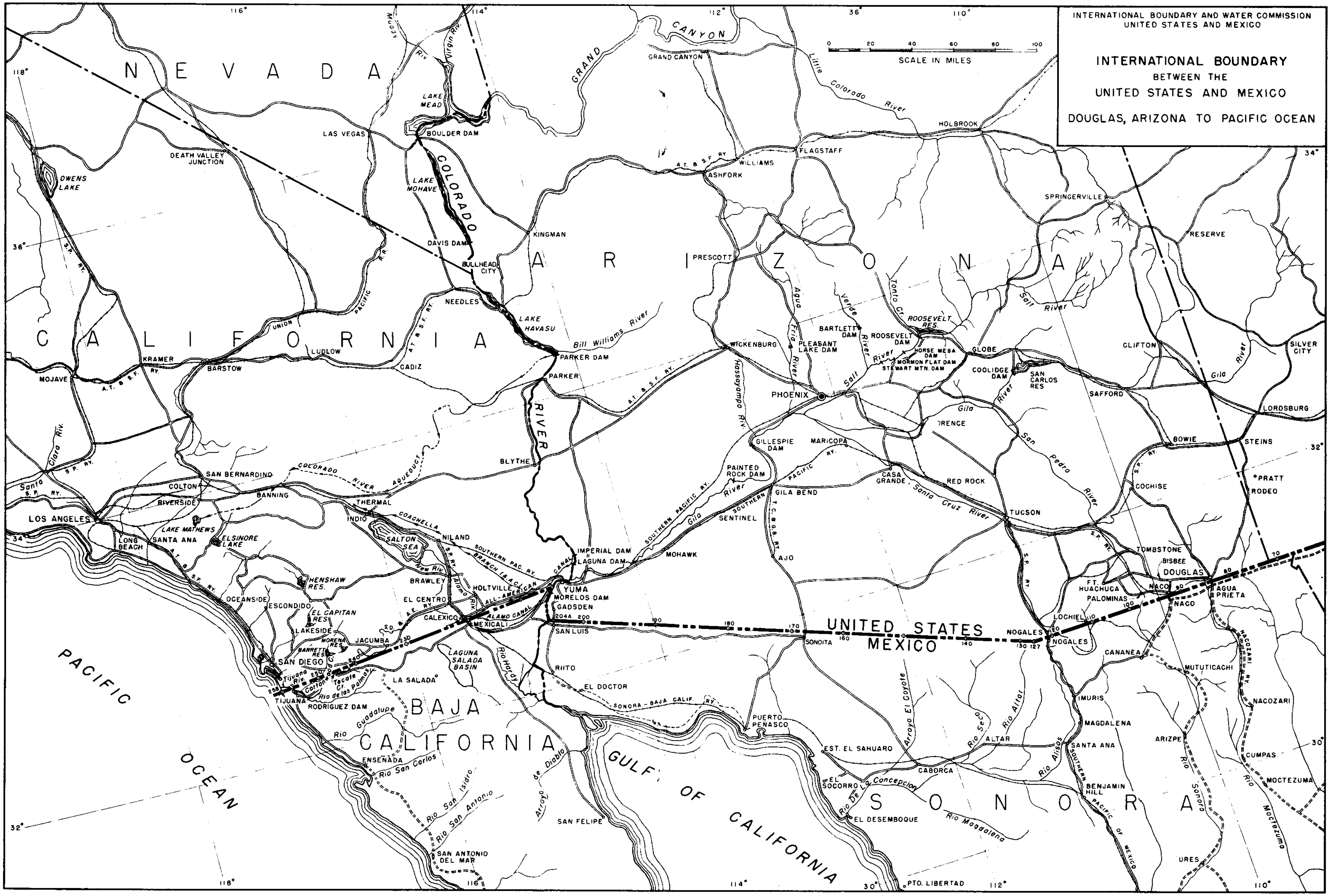
Month	Yuma Citrus Station, Arizona	
	1988	Average 1931-1988
Jan.	3.92	3.87
Feb.	#	4.77
Mar.	8.31	7.41
Apr.	8.41	10.02
May	11.58	12.92
June	12.45	14.20
July	13.81	15.20
Aug.	11.35	13.38
Sept.	9.59	10.57
Oct.	6.68	7.46
Nov.	4.25	4.88
Dec.	4.22	3.64
Yearly		108.32

IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		San Luis R. C. Sonora		Delta, Baja California	
	1988	Average 1948-1987	1988	Average 1926-1987	1988	Average 1948-1988	1988	Average 1953-1988	1988	Average 1948-1988
Jan.	#	4.45	#	-	3.46	3.78	#	3.27	#	3.35
Feb.	#	5.24	#	-	#	4.61	#	4.09	5.75	4.33
Mar.	#	7.48	#	-	#	6.85	#	6.18	6.06	6.10
Apr.	#	10.31	#	-	#	8.70	#	8.23	5.43	7.99
May	#	12.87	#	-	#	11.46	#	10.94	8.31	10.12
June	#	13.94	#	-	#	12.95	#	12.52	9.53	10.79
July	#	13.90	#	-	#	12.80	2.80	13.23	10.08	11.46
Aug.	#	12.48	#	-	#	11.06	3.94	11.81	8.15	10.43
Sept.	#	10.31	#	-	#	9.13	2.13	8.98	8.03	8.50
Oct.	#	8.15	#	-	#	6.42	4.65	6.26	5.79	6.06
Nov.	#	5.28	#	-	#	4.80	2.28	4.17	4.84	4.29
Dec.	#	4.25		-	#	3.43	1.93	3.11	5.83	3.54
Yearly	-	109.65	-	-		95.98	-	95.71	-	78.50

Month	Colonia Juarez, Baja California		Laguna Salada, Baja California	
	1988	Average 1970-1987	1988	Average 1975-1987
Jan.	#	3.50	#	-
Feb.	#	4.49	#	-
Mar.	#	6.54	#	-
Apr.	#	8.31	#	-
May	#	10.87	#	-
June	#	12.64	#	-
July	#	12.76	#	-
Aug.	#	10.94	#	-
Sept.	#	9.45	#	-
Oct.	#	7.28	#	-
Nov.	#	4.88	#	-
Dec.	#	3.35	#	-
Yearly	-	97.24	-	-

Missing record


INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
INTERNATIONAL BOUNDARY
BETWEEN THE
UNITED STATES AND MEXICO
DOUGLAS, ARIZONA TO PACIFIC OCEAN
SCALE IN MILES
0 20 40 60 80 100
NEVADA
CALIFORNIA
ARIZONA
BAJA CALIFORNIA
SONORA
UNITED STATES
MEXICO
PACIFIC OCEAN
GULF OF CALIFORNIA
GRAND CANYON
COLORADO RIVER
Little Colorado River
Bill Williams River
Salt River
Gila River
San Pedro River
Santa Cruz River
Hassayampa Riv.
Agua Fria River
Verde River
Tonto Cr.
New Riv.
Alamo Riv.
Rio Hardy
Rio Sonora
Rio Moctezuma
Rio Magdalena
Rio Altar
Rio Seco
Rio Alisos
Rio De La Concepcion
Arroyo El Coyote
Arroyo de Diablo
Rio Guadalupe
Rio San Carlos
Rio San Isidro
Rio San Antonio
Rio de las Palmas
Tijuana Riv.
Cottonwood Cr.
Tecate Cr.
Santa Clara Riv.
LAKE MEAD
BOULDER DAM
LAKE MOHAVE
DAVIS DAM
LAKE HAVASU
PARKER DAM
OWENS LAKE
SALTON SEA
ROOSEVELT RES.
ROOSEVELT DAM
BARTLETT DAM
PLEASANT LAKE DAM
HORSE MESA DAM
MORMON FLAT DAM
STEWART MTN. DAM
COOLIDGE DAM
SAN CARLOS RES
GILLESPIE DAM
PAINTED ROCK DAM
IMPERIAL DAM
LAGUNA DAM
MORELOS DAM
HENSHAW RES.
EL CAPITAN RES.
BARRETT RES.
MORENA RES.
RODRIGUEZ DAM
LAKE MATHEWS
ELSINORE LAKE
COLORADO RIVER AQUEDUCT
ALL-AMERICAN CANAL
ALAMO CANAL
COACHELLA
LAGUNA SALADA BASIN
LAS VEGAS
DEATH VALLEY JUNCTION
KINGMAN
BULLHEAD CITY
NEEDLES
PARKER
BLYTHE
GRAND CANYON
WILLIAMS
FLAGSTAFF
ASHFORK
HOLBROOK
SPRINGERVILLE
RESERVE
PRESCOTT
WICKENBURG
PHOENIX
GLOBE
CLIFTON
SILVER CITY
SAFFORD
LORDSBURG
FLORENCE
MARICOPA
CASA GRANDE
RED ROCK
BOWIE
STEINS
COCHISE
PRATT
RODEO
TUCSON
TOMBSTONE
BISBEE
DOUGLAS
AGUA PRIETA
NACO
FT. HUACHUCA
PALOMINAS
LOCHIEL
NOGALES
GILA BEND
SENTINEL
MOHAWK
AJO
SONOITA
YUMA
GADSDEN
SAN LUIS
RIITO
EL DOCTOR
PUERTO PENASCO
KRAMER
MOJAVE
BARSTOW
LUDLOW
CADIZ
SAN BERNARDINO
COLTON
RIVERSIDE
BANNING
LOS ANGELES
LONG BEACH
SANTA ANA
THERMAL
INDIO
NILAND
BRAWLEY
HOLTVILLE
EL CENTRO
CALEXICO
MEXICALI
OCEANSIDE
ESCONDIDO
LAKESIDE
JACUMBA
SAN DIEGO
TIJUANA
LA SALADA
ENSENADA
SAN FELIPE
SAN ANTONIO DEL MAR
EST. EL SAHUARO
EL SOCORRO
EL DESEMBOQUE
CABORCA
ALTAR
PTO. LIBERTAD
CANANEA
MUTUTICACHI
NACOZARI
IMURIS
MAGDALENA
SANTA ANA
BENJAMIN HILL
ARIZPE
CUMPAS
MOCTEZUMA
URES
UNION PACIFIC R.R.
A.T. & S.F. RY.
S.P. RY.
SOUTHERN PACIFIC RY.
SOUTHERN PAC. RY. BRANCH (A.A.C.)
S.D. & A.E. RY.
T.C. & G.B. RY.
SONORA - BAJA CALIF. RY.
NACOZARI RY.
SOUTHERN PACIFIC OF MEXICO
118° 116° 114° 112° 110°
36° 34° 32° 30°
258 250 240 230 204A 200 190 180 170 160 140 130 127 120 110 100 90 80 70

TEMPERATURE IN THE COLORADO RIVER BASIN
IN DEGREES FAHRENHEIT

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few feet above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

	Blythe, California				Yuma Citrus Station, Arizona				Brawley, California			
	1988			Average	1988			Average	1988			Average
Month	Mean	Max.	Min.	1931-88	Mean	Max.	Min.	1931-88	Mean	Max.	Min.	1931-88
Jan.	52.2	79	30	52.7	53.0	76	33	53.3	53.4	79	27	54.0
Feb.	58.8	80	34	57.4	59.2	83	32	57.1	60.2	84	31	58.2
Mar.	65.5	100	37	63.0	63.5	97	33	62.1	64.5	99	35	63.2
Apr.	70.5	99	46	70.1	67.8	99	42	68.7	68.7	99	40	69.8
May	78.3	109	49	77.6	75.5	107	46	75.8	76.2	109	45	77.2
June	86.6	113	55	85.6	83.9	110	56	83.7	83.1	109	50	85.1
July	94.1	113	70	92.4	90.6	110	67	90.9	90.8	112	65	91.7
Aug.	90.7	112	68	91.0	88.9	110	65	90.2	90.2	111	62	91.3
Sept.	83.2	109	50	84.8	83.0	108	55	84.8	84.2	111	56	86.0
Oct.	78.9	106	56	73.1	78.9	104	58	73.5	79.7	106	56	75.0
Nov.	61.5	93	33	60.1	62.7	95	36	61.3	64.2	98	35	62.5
Dec.	* 52.7	* 78	* 26	53.2	53.1	76	26	54.4	54.9	84	24	55.1
Yearly	72.8	113	* 26	71.8	71.7	110	26	71.3	72.5	112	24	72.4

	El Centro, California				Bullhead City, Arizona							
	1988			Average	1988			Average				
Month	Mean	Max.	Min.	1931-88	Mean	Max.	Min.	1978-88				
Jan.	55.6	80	32	54.1	52.7	73	31	53.7				
Feb.	61.8	83	36	58.2	60.2	82	37	58.3				
Mar.	65.8	97	39	63.1	65.2	97	38	63.3				
Apr.	69.7	97	46	69.6	71.2	99	44	71.5				
May	76.9	107	47	77.2	81.2	110	51	80.7				
June	85.0	108	55	85.2	90.9	118	60	90.4				
July	91.8	112	67	91.7	97.5	118	73	94.8				
Aug.	90.3	110	64	91.0	92.8	116	66	93.5				
Sept.	84.7	109	57	85.5	85.9	111	58	86.2				
Oct.	79.5	103	57	74.6	79.6	105	50	74.4				
Nov.	64.3	94	40	62.2	63.1	94	39	61.3				
Dec.	55.5	81	30	54.8	54.7	76	28	53.2				
Yearly	73.4	112	30	72.2	74.6	118	28	73.4				

IN MEXICO

	Los Algodones, Baja California				Mexicali, Baja California				Bataques, Baja California			
	1988		1948-1987		1988		1926-1988		1988		1948-1988	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	#	#	88	23	73	34	93	19	77	27	113	16
Feb.	#	#	95	28	86	39	93	23	84	36	99	21
Mar.	#	#	100	32	99	41	100	30	99	37	113	25
Apr.	#	#	109	37	95	45	106	34	99	43	118	16
May	#	#	117	43	104	52	117	43	109	43	124	34
June	#	#	126	52	108	54	120	48	113	54	135	43
July	#	#	118	61	111	72	118	55	111	64	133	45
Aug.	#	#	120	61	106	70	120	54	111	63	129	46
Sept.	#	#	122	50	106	61	122	48	109	54	135	39
Oct.	#	#	111	32	100	61	111	32	106	57	118	32
Nov.	#	#	100	27	95	43	104	28	95	34	115	32
Dec.	#	#	90	23	82	30	90	23	81	27	97	25
Yearly	-	-	126	23	111	30	122	19	113	27	135	16

* Blythe FAA Airport # Missing record

TEMPERATURE IN THE COLORADO RIVER BASIN
IN DEGREES FAHRENHEIT

IN MEXICO

	Riito, Sonora				San Felipe, Baja California				San Luis, R. C., Sonora			
	1988		1949-1988		1988		1969-1988		1988		1949-1988	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	79	34	91	19	84	36	99	30	82	34	100	19
Feb.	88	34	95	21	86	46	102	32	90	36	109	27
Mar.	95	37	100	25	95	48	104	32	104	34	108	28
Apr.	100	41	109	36	#	#	113	34	104	36	115	36
May	111	43	115	41	99	57	120	41	120	41	120	41
June	115	52	124	45	#	#	124	50	120	50	126	45
July	115	57	140	52	115	75	124	50	115	61	126	50
Aug.	115	57	122	46	109	72	135	41	113	61	126	55
Sept.	115	52	118	39	115	68	126	37	113	54	118	50
Oct.	104	57	115	30	104	63	117	23	108	55	118	32
Nov.	102	36	118	27	102	43	118	21	95	36	113	28
Dec.	79	21	86	21	81	41	97	28	82	25	102	23
Yearly	115	21	140	19	-	-	135	21	120	25	126	19

	Delta, Baja California				Colonia Juarez, Baja California				Laguna Salada, Baja California			
	1988		1948-1988		1988		1964-1987		1988		1975-1987	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	72	34	104	27	#	#	91	19	#	#	84	18
Feb.	86	41	104	28	#	#	102	21	#	#	95	27
Mar.	90	41	113	28	#	#	97	25	#	#	95	32
Apr.	104	43	118	32	#	#	115	30	#	#	100	36
May	111	46	129	32	#	#	117	36	#	#	115	39
June	115	50	133	36	#	#	122	39	#	#	120	50
July	122	66	135	45	#	#	122	45	#	#	122	54
Aug.	115	64	140	64	#	#	118	50	#	#	118	52
Sept.	113	52	135	39	#	#	122	39	#	#	118	48
Oct.	108	55	117	34	#	#	108	36	#	#	118	36
Nov.	104	39	120	32	#	#	104	25	#	#	95	28
Dec.	84	27	104	27	#	#	97	19	#	#	86	19
Yearly	122	27	140	27	-	-	122	19	-	-	122	18

	El Centinela, Baja California			
	1988		1977-1988	
Month	Max.	Min.	Max.	Min.
Jan.	81	36	84	34
Feb.	88	41	90	25
Mar.	97	46	97	41
Apr.	104	48	106	46
May	111	54	113	52
June	113	64	118	50
July	113	75	120	68
Aug.	113	68	115	64
Sept.	111	64	115	52
Oct.	111	68	111	50
Nov.	100	45	100	39
Dec.	84	34	84	28
Yearly	113	34	120	25

Missing record

IRRIGATED AREAS ALONG COLORADO RIVER BELOW IMPERIAL DAM

1988

The total drainage area within the Colorado River basin is about 246,000 square miles, of which 184,600 square miles lie above Imperial Dam and about 61,400 square miles are below the dam. Of the area below Imperial Dam, 59,400 square miles are in the United States and about 2,000 square miles are in Mexico. The area below Imperial Dam includes the Gila River watershed with a total area of about 58,200 square miles, of which about 1,100 square miles are in Mexico.

The irrigated areas tabulated below comprise the areas in the United States and Mexico which are served by diversions from the Colorado River at or below Imperial Dam. The diversions are supplemented by some pumping from wells in both countries. The areas in the United States include: 1) those within the U. S. Bureau of Reclamation Projects and in the North and South Gila Valleys located near Yuma, Arizona, the data for which are furnished by the U. S. Bureau of Reclamation; 2) those within the Coachella Valley, California, the data for which are furnished by the Coachella Valley County Water District; and 3) those within the Imperial Valley; California, the data for which are furnished by the Imperial Irrigation District. The areas in Mexico include those in the Mexicali Valley located in the states of Baja California and Sonora, the data for which are furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico. The areas tabulated below refer to the total areas farmed, and insofar as possible, duplication of irrigated areas because of double cropping has been eliminated.

Point of Diversion from Colorado River and Designation of Areas	Total Irrigated Areas Acres
IN UNITED STATES:	
Imperial Dam	
Yuma Valley Division	45,779
Reservation Division	12,276
Yuma Mesa	16,629
Yuma Aux. Project Unit "B" (Yuma Mesa)	2,695
South Gila Valley	9,575
North Gila Valley	5,436
Wellton-Mohawk	59,135
Coachella Valley	58,106
Imperial Valley	460,965
Warren Act	80
Non-Project lands adjacent to Colorado River	12,560
Total in United States	683,236
IN MEXICO:	
Morelos Dam	
Mexicali Valley	* 529,850
Total in United States and Mexico	1,213,086

* An estimated 33% of total acreage is served by pumping from ground water in Mexicali Valley

10-2545.80 ALAMO RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Staff gage located on the right bank of the river, about 7 miles (11.3 km) east of Calexico, California, immediately downstream from the international land boundary between the United States and Mexico and a few feet upstream from a 4-foot (1.22 m) Cipolletti weir in the throat of a twin-tube concrete culvert which carries the river flow under the All-American Canal.

RECORDS: Computed on the basis of head on the Cipolletti weir from daily staff gage readings, and weir ratings as determined by monthly current meter measurements. Records obtained and furnished by Imperial Irrigation District. Records available: June 1942 through 1988.

REMARKS: The flow at this station normally comprises seepage from the All-American Canal and drainage water from the Mexicali Valley which enters the United States.

EXTREMES: Maximum mean daily discharge, 258 second-feet (7.31 m3/sec) (estimated), April 13, 1946; minimum discharge, no flow July 22-23, 29-30, 1949. Prior to the period of record, and since 1900, considerably higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a part of its flow passed through the Alamo River channel.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.96	3.24	3.79	4.35	4.35	2.75	1.92	4.35	2.34	1.92	2.33	2.75
2	2.96	2.96	3.79	4.62	4.35	* 3.00	2.13	3.24	2.13	1.92	2.13	2.65
3	2.96	2.96	3.79	4.07	4.35	3.65	2.13	2.96	2.23	1.92	2.13	2.54
4	2.96	2.96	3.79	4.07	4.35	* 3.00	2.13	2.54	2.34	2.23	2.44	2.34
5	2.96	2.96	3.79	3.79	4.35	2.65	2.13	2.23	2.44	1.92	2.34	2.65
6	2.96	4.07	4.35	4.35	4.35	3.24	1.92	1.74	1.92	2.02	2.34	2.54
7	2.75	4.07	3.93	3.93	4.07	2.96	1.92	1.92	1.92	1.92	2.44	2.65
8	3.24	5.03	4.62	4.49	4.07	3.24	2.34	1.92	2.34	2.13	2.44	2.96
9	2.96	2.96	4.35	4.35	4.62	2.75	2.34	1.92	2.34	1.92	2.34	2.96
10	2.75	3.52	5.72	3.65	3.24	3.38	2.13	2.44	1.92	1.92	2.44	3.24
11	3.38	3.93	4.35	3.65	2.75	2.96	2.13	1.92	1.92	2.13	2.34	3.38
12	2.96	3.38	4.35	3.52	2.75	1.92	2.13	1.92	1.92	2.02	2.44	2.75
13	3.38	4.07	5.03	3.52	2.23	2.75	2.65	2.13	1.92	2.23	2.34	2.65
14	3.93	3.24	5.03	3.52	2.44	3.52	3.38	2.34	2.13	2.13	2.65	2.75
15	3.65	3.52	4.35	4.90	3.24	3.93	2.34	1.92	2.23	1.92	2.54	2.65
16	2.96	2.96	4.35	4.90	2.44	2.65	2.13	1.92	2.23	2.13	2.44	2.54
17	2.96	3.24	4.35	4.35	2.44	2.65	2.23	1.92	1.92	1.92	2.44	2.54
18	2.96	3.79	3.52	4.35	1.92	2.96	2.96	1.74	1.74	1.74	2.44	2.54
19	2.96	4.07	3.65	4.90	2.13	2.44	1.92	1.74	1.83	2.13	2.54	2.54
20	3.24	3.79	3.65	5.89	1.92	2.96	2.34	1.92	1.92	1.92	2.54	2.75
21	2.96	4.07	3.38	7.36	2.23	3.65	2.13	6.87	1.92	1.92	2.75	2.44
22	2.96	4.76	3.38	4.35	2.23	2.96	2.34	5.03	3.38	1.92	2.54	2.44
23	2.75	4.62	2.96	4.35	2.34	2.96	1.92	2.96	1.55	2.54	2.54	2.65
24	2.96	3.52	3.24	4.62	2.34	2.75	2.65	6.87	1.55	2.96	2.44	2.65
25	2.96	3.24	3.93	4.90	2.54	1.92	2.13	2.44	1.55	2.54	2.54	2.54
26	3.38	3.24	5.03	4.90	2.75	1.92	2.23	2.44	1.37	2.34	2.65	2.75
27	3.10	4.21	6.22	4.35	2.34	2.23	2.34	2.54	2.13	2.23	2.54	2.44
28	1.92	3.38	6.87	4.35	2.65	2.44	2.23	2.75	1.92	2.13	2.65	2.44
29	3.65	3.52	5.72	4.35	2.23	2.44	2.65	2.34	1.28	2.75	2.54	1.92
30	3.93		4.90	4.35	2.13	1.92	2.75	2.54	1.83	2.34	2.65	2.75
31	3.93		4.90		1.92		2.96	2.75		2.44		2.54
Sum	96.34	105.28	135.08	133.05	92.06	84.55	71.63	84.26	60.16	66.20	73.92	81.93

Current Year 1988 — **Period 1943-1988**

Month	ø Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	0.47	0.30	!14	3.93	28	1.92	3.11	191	300	2,790	99.0
Feb.	.55	.40	8	5.03	! 2	2.96	3.63	209	274	2,822	90.2
Mar.	.67	.40	28	6.87	23	2.96	4.36	268	312	3,154	87.1
Apr.	.70	.44	21	7.36	!12	3.52	4.44	264	330	2,222	97.0
May	.52	.30	9	4.62	!18	1.92	2.97	183	262	1,799	73.0
June	.73	.30	15	3.93	!12	1.92	2.82	168	252	1,686	61.0
July	.43	.30	14	3.38	! 1	1.92	2.31	142	233	1,712	59.0
Aug.	.67	.28	!21	6.87	! 6	1.74	2.72	167	275	1,672	65.7
Sept.	.43	.23	22	3.38	29	1.28	2.01	119	257	1,406	83.5
Oct.	.40	.28	24	2.96	18	1.74	2.14	131	271	1,845	61.6
Nov.	.38	.32	21	2.75	! 2	2.13	2.46	147	281	2,080	62.4
Dec.	.43	.30	11	3.38	29	1.92	2.64	163	268	1,686	80.0
	0.73	0.23		7.36		1.28	2.96	2,152	3,315	22,146	1,071
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	0.22	0.07		0.21		0.04	0.08	2,654	4,089	27,317	1,321

ø Mean daily ! And other days * Estimated

10-2549.70 NEW RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder located on the left (west) bank of the river in the limits of the city of Calexico, California, 1,400 feet (427 m) downstream (north) from the international land boundary between the United States and Mexico. Measurements are made from a foot bridge at the gage.
RECORDS: Based on a continuous record of gage heights and current meter measurements by the Imperial Irrigation District. Records computed and furnished by the District. Records available: June 1942 through 1988.
REMARKS: The New River flows northward from Mexico into the United States and thence into the Salton Sea. The flow at this station normally comprises 1) a portion of the waste and drainage water from the irrigation system in the Mexicali Valley, and 2) sewage and other wastes from Mexicali, Baja California. Flood waters enter the river from local drainage in Mexico, and such waters can reach damaging rates during violent desert storms. Waste flows from the Mexican system of canals are limited to an average annual quantity of 35,000 acre-feet (43,172,000 m3) during any successive five-year period under the provisions of Minute No. 197 of the Commission.
EXTREMES: Maximum mean daily discharge, 1,030 second-feet (29.2 m3/sec) on December 9, 1982; minimum mean daily discharge, 2 second-feet (0.06 m3/sec) on May 14, 1945. Prior to the period of record, and since 1900, much higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a considerable part of its flow passed through the New River channel.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	314	307	375	326	335	313	263	344	340	254	296	239
2	346	366	393	329	331	303	259	362	315	244	277	239
3	366	364	379	344	333	288	267	368	317	244	258	251
4	358	373	363	356	352	295	269	350	301	255	266	283
5	354	333	377	383	377	289	278	330	282	260	291	298
6	334	315	396	394	336	304	292	323	267	260	289	304
7	319	320	394	386	307	295	289	317	257	258	283	300
8	303	316	415	355	312	284	285	311	237	273	284	300
9	290	339	402	359	317	282	267	322	234	282	275	287
10	299	308	371	346	345	282	270	314	226	268	265	274
11	314	299	356	357	333	289	271	307	220	263	259	267
12	357	301	339	349	318	301	271	292	215	244	254	277
13	395	286	323	348	304	291	274	289	217	229	244	307
14	409	283	318	348	292	276	274	287	220	221	259	335
15	397	294	317	373	295	269	260	293	227	220	258	330
16	384	307	315	406	297	272	256	299	227	239	273	304
17	389	300	313	398	288	270	273	316	240	261	267	292
18	392	294	302	406	293	267	269	324	252	285	256	287
19	432	308	305	433	297	264	273	332	253	298	242	292
20	409	302	305	451	297	259	282	374	246	277	242	294
21	369	319	319	452	302	264	281	428	239	275	240	284
22	329	330	332	429	296	262	291	513	238	268	233	283
23	318	359	354	429	291	256	309	559	240	314	244	277
24	318	343	360	410	299	268	328	706	241	331	262	301
25	328	317	345	399	299	271	341	577	241	315	259	352
26	350	308	331	410	289	271	350	550	249	275	255	339
27	341	309	339	397	279	285	344	559	283	263	252	338
28	333	311	332	366	289	294	346	516	283	272	264	326
29	337	334	335	346	291	277	339	456	291	298	252	298
30	353		323	335	287	264	343	415	263	293	241	265
31	323		318		313		343	377		295		249
Sum	10,860	9,245	10,746	11,420	9,594	8,405	9,057	12,110	7,661	8,334	7,840	9,072

Month	Extreme Gage Feet ** High	Extreme Gage Feet ** Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Acre-Feet Average	Acre-Feet Maximum	Acre-Feet Minimum
	Current Year 1988								Period 1943-1988		
Jan.	38.89	40.25	19	432	9	290	350	21,540	9,722	22,203	1,751
Feb.	39.45	40.32	4	373	14	283	319	18,337	8,654	21,416	1,258
Mar.	39.05	40.13	8	415	18	302	347	21,314	9,727	25,305	1,008
Apr.	38.70	39.90	21	452	1	326	381	22,651	10,113	27,618	1,390
May	39.41	40.35	5	377	27	279	309	19,029	9,145	24,111	629
June	40.03	40.58	1	313	23	256	280	16,671	7,755	20,287	1,087
July	39.67	40.58	26	350	16	256	292	17,964	8,318	22,998	817
Aug.	36.39	40.31	24	706	14	287	391	24,020	9,565	27,618	1,139
Sept.	39.76	40.98	1	340	12	215	255	15,195	9,039	23,714	1,795
Oct.	39.85	40.93	24	331	15	220	269	16,530	9,087	22,758	2,081
Nov.	40.19	40.80	1	296	22	233	261	15,550	8,568	20,519	2,483
Dec.	39.65	40.74	25	352	! 1	239	293	17,994	9,714	22,784	1,763
Yearly	36.39	40.98		706		215	312	226,795	109,407	267,896	24,573
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	11.09	12.49		20.0		6.09	8.84	279,747	134,951	330,444	30,310

ø Mean daily ! And other days ** Feet below mean sea level

10-2549.60 WASTES FROM MEXICALI POTABLE WATER PLANT TO NEW RIVER IN MEXICO

ESCRIPTION: An 11.5-foot (3.50 m) Parshall flume installed by the State Commission of Public Services of Mexicali. Located 1.2 miles (2.0 km) upstream of the pumping plant on the supply canal. Excess water discharges into an open channel, thence into a 36-inch (91 cm) diameter pipe that empties into Rivera Drain (Drain 134), which is 1.2 miles (2.0 km) below the plant and 1.2 miles (2.0 km) south of the international boundary. From this point the waste is carried by a closed concrete box conduit into New River.

RECORDS: During 1988 the mean daily flows were computed from the total inflow to the potable water plant as measured at the Parshall flume, less the water pumped to the city and the water used in the maintenance of the plant. The records are obtained and furnished by the State Commission of Public Services of Mexicali. Records available: January 1968 through December 1988.

REMARKS: The plant began operation on September 28, 1963 by the State Commission of Public Services of Mexicali. Before 1968 the flow was small and infrequent. The potable water plant obtains water from the West Main Canal, which is a part of Mexico's system of canals in the Colorado Irrigation System. Excess water discharges into a closed conduit that empties into New River 0.9 mile (1.4 km) upstream of the international boundary.

EXTREMES: Maximum instantaneous discharge, 81.9 second-feet (2.32 m3/sec) on March 26, 1969; minimum instantaneous discharge, zero during several days in the years 1977 through 1988.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	1.4	1.8	1.8	1.8	2.1	1.8	1.8	1.1	1.1	0.4	1.8
2	0	1.4	0	1.8	1.4	1.8	1.8	1.1	1.1	.7	.7	1.1
3	.7	1.8	1.8	1.8	1.4	1.4	1.4	1.8	1.1	1.1	1.1	1.1
4	1.4	1.4	1.8	1.8	.7	1.8	1.4	1.1	1.1	1.1	1.8	1.1
5	0	0	1.8	0	0	1.4	0	1.8	1.1	1.1	0	1.1
6	1.8	0	1.1	1.8	1.8	1.8	1.4	1.1	1.1	1.1	0	1.1
7	0	1.4	1.1	1.8	1.8	1.8	1.8	1.1	1.1	.7	.7	1.1
8	1.8	0	1.8	1.8	1.8	1.4	1.4	1.8	1.1	0	1.8	1.1
9	1.8	1.4	1.1	1.8	1.8	1.8	1.8	1.1	1.1	1.1	1.1	1.1
10	1.8	0	1.8	1.8	1.8	1.8	2.5	1.1	0	0	1.1	1.1
11	1.8	1.4	1.8	1.8	.7	1.4	2.1	1.1	1.1	.4	1.1	1.1
12	0	1.4	0	1.8	.7	1.4	1.8	1.8	1.1	.4	1.8	1.1
13	1.4	0	1.8	1.8	1.8	1.8	1.4	1.1	.7	1.1	1.1	0
14	1.8	1.4	1.8	1.8	1.8	1.8	.7	1.1	1.1	0	.7	.7
15	1.8	1.4	1.8	1.8	1.8	1.4	1.4	1.1	1.1	0	1.1	1.1
16	0	1.4	1.8	.7	1.4	1.8	1.8	1.8	.7	1.8	.4	1.1
17	1.8	1.4	1.8	1.8	1.8	1.8	1.4	1.1	1.1	0	.7	1.1
18	1.8	1.4	1.1	1.8	1.8	2.1	1.8	1.8	.7	.7	.7	1.1
19	1.8	0	1.8	1.8	1.4	1.8	1.8	1.1	1.1	1.1	.7	1.1
20	0	1.4	1.1	1.8	.7	1.8	1.8	1.1	1.1	1.1	.7	.7
21	1.8	1.4	1.8	1.8	.7	1.4	1.8	1.1	1.1	1.1	0	1.1
22	1.8	1.4	1.8	1.8	1.4	1.4	1.8	1.1	1.1	1.1	.7	1.1
23	0	1.4	1.4	1.8	1.4	1.4	1.8	1.1	1.1	0	.7	.7
24	0	1.4	1.4	1.8	.7	1.4	1.4	1.1	.7	0	1.8	1.1
25	0	0	1.4	1.8	1.4	2.5	2.1	1.8	1.1	.7	1.1	1.1
26	0	0	.7	1.8	1.8	1.8	1.8	2.1	1.1	.7	1.1	1.1
27	0	0	0	.7	1.4	1.4	1.8	1.8	1.1	.4	1.1	0
28	1.8	1.4	.7	1.8	1.8	1.4	1.8	1.1	1.1	0	1.8	1.1
29	1.8	.7	1.4	1.1	2.8	1.4	1.8	1.1	1.1	0	1.1	1.1
30	0		1.4	1.1	1.8	1.4	1.4	.4	1.1	0	1.1	0
31	0		1.4		1.8		1.4	.4		0		0
Sum	28.7	27.7	42.3	48.6	45.2	49.7	50.2	40.0	30.3	18.6	28.2	29.2

Month	Extreme Gage Feet		Ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
			Current Year 1988						**Period 1968-1988**		
Jan.			! 6	1.8	! 1	0	1.1	56.0	158	520	0
Feb.			3	1.8	! 5	0	1.1	55.4	98.9	311	0
Mar.			! 1	1.8	! 2	0	1.4	82.7	199	871	33.6
Apr.			! 1	1.8	5	0	1.4	94.9	191	431	68.1
May			29	2.8	5	0	1.4	89.2	203	435	46.2
June			25	2.5	! 3	1.4	1.8	98.1	182	409	21.0
July			10	2.5	5	0	1.8	98.9	229	528	0
Aug.			26	2.1	!30	.4	1.4	77.0	250	596	77.0
Sept.			! 1	1.1	10	0	1.1	58.1	233	549	58.1
Oct.			16	1.8	! 8	0	.7	35.8	217	507	35.8
Nov.			! 4	1.8	! 5	0	1.1	54.6	192	504	54.6
Dec.			1	1.8	!13	0	1.1	56.0	179	597	32.9
				2.8		0	1.1	857	2,372	5,359	857
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				0.08		0	0.03	1,057	2,926	6,610	1,057

Ø Mean daily ! And other days

10-2549.65 WASTE WATERS FROM MEXICAN SYSTEM OF CANALS ENTERING THE UNITED STATES

DESCRIPTION: During 1988 the only flow to the New River in Mexico was waste from the City of Mexicali Potable Water Plant, which discharges into Rivera Drain and then to New River, and drainage water coming from the Colorado River District system of canals that enter the New River below Laguna Xochimilco.

RECORDS: Records of the Potable Water Plant are based on flows measured on a Parshall flume less pumping to the city. Records obtained and furnished by the State Commission of Public Sevices of Mexicali. Records available: Wisteria Wasteway, January 1951 through 1975; Sifon Wasteway, January 1952 to April 30, 1964; Pueblo Nuevo Wasteway, January 1956 through 1965; and the Potable Water Plant, January 1968 through December 1988.

REMARKS: To obtain data for Sifon and Pueblo Nuevo Wasteways, see bulletins 1 to 6 (1960-1965);and for Wisteria Wasteway, bulletins 1 to 16 (1960-1975). For data on wastes from Potable Water Plant, see page 51 of this bulletin.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1956-1988		
		Average	Maximum	Minimum
January	1,021	957	8,758	6.3
February	340	674	7,281	6.3
March	589	486	2,610	21.7
April	643	439	3,194	16.1
May	89.2	291	1,176	9.1
June	139	379	5,670	0
July	122	566	10,251	0
August	1,622	550	4,137	0
September	98.1	418	3,215	21.0
October	136	552	3,474	8.4
November	95.7	574	3,784	0
December	390	906	8,691	0
Yearly	5,285	6,789	27,430	399
	Thousands of Cubic Meters			
	6,519	8,374	33,835	492

10-2540.05 SALTON SEA - ELEVATIONS OF WATER SURFACE

DESCRIPTION: Water-stage recorder and staff gage located on the western shore of the Salton Sea, 15.5 miles (24.9 km) northwest of Westmorland, Imperial County, California. The Salton Sea is the sink of a closed basin which has a drainage area of 8,360 square miles (21,652 km2). Zero of the gage is 250.00 feet (76.2 m) below mean sea level, U. S. C. & G. S. datum.

RECORDS: Records of water surface elevations available from November 1904 through 1988. From January 1925 to October 22, 1951, once monthly records of elevations were collected by Imperial Irrigation District from a bench mark at Figtree John's Spring, about 22 miles (35.4 km) northwest along the western shore from the present gage. Since October 24, 1951, a continuous record of gage heights has been obtained by the U. S. Geological Survey at new gaging station published as "Salton Sea near Westmorland, California." The elevation of the old station is at a datum of one foot (0.30 m) higher than that of the present station. All records reported below and the area and capacity table are adjusted to the datum of the present station.

REMARKS: Runoff from the basin, irrigation drainage and waste water from Imperial and Coachella Valleys in the United States, and drainage and waste water from part of the Mexicali Valley in Mexico discharge into the Salton Sea. Water from Mexico enters the United States in the Alamo and New River channels. The bottom of the sea is 277.7 feet (84.6 m) below mean sea level, U. S. C. & G. S. datum.

EXTREMES: Maximum elevation during year, 227.1 feet (69.2 m) below mean sea level. Minimum elevation during year, 228.3 feet (69.6 m) below mean sea level. Extremes for period of record, maximum elevation 195.9 feet (59.7 m) below mean sea level, February 10 to March 29, 1907; minimum elevation since 1906, 251.6 feet (76.7 m) below mean sea level in November 1924.

MEAN DAILY WATER SURFACE ELEVATION IN FEET BELOW MEAN SEA LEVEL - 1988

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	227.9	227.7	227.5	227.2	227.2	227.2	227.4	227.6	227.8	228.1	228.0	228.2
2	228.0	227.6	227.5	227.2	227.2	227.2	227.4	227.6	227.8	228.1	228.0	228.2
3	228.0	227.6	227.5	227.2	227.2	227.2	227.4	227.6	227.8	228.1	228.0	228.2
4	228.0	227.6	227.4	227.2	227.2	227.2	227.4	227.6	227.8	228.1	228.0	228.2
5	228.0	227.6	227.4	227.2	227.2	227.3	227.4	227.6	227.8	228.1	228.0	228.2
6	228.0	227.6	227.4	227.2	227.2	227.3	227.4	227.6	227.8	228.1	228.1	228.2
7	228.0	227.6	227.4	227.2	227.2	227.3	227.4	227.6	227.8	228.1	228.1	228.2
8	228.0	227.6	227.4	227.2	227.2	227.3	227.4	227.6	227.8	228.1	228.1	228.2
9	227.9	227.6	227.4	227.2	227.2	227.3	227.4	227.7	227.8	228.1	228.1	228.2
10	227.9	227.6	227.4	227.2	227.2	227.4	227.4	227.7	227.8	228.1	228.1	228.2
11	227.9	227.6	227.4	227.2	227.2	227.4	227.5	227.7	227.8	228.1	228.1	228.2
12	227.9	227.6	227.4	227.2	227.2	227.4	227.5	227.7	227.9	228.1	228.1	228.2
13	227.9	227.6	227.4	227.2	227.1	227.4	227.5	227.7	227.9	228.1	228.1	228.2
14	227.9	227.6	227.4	227.2	227.1	227.4	227.5	227.7	227.9	228.1	228.1	228.2
15	227.8	227.6	227.4	227.2	227.1	227.4	227.5	227.8	227.9	228.1	228.1	228.2
16	227.8	227.5	227.4	227.1	227.1	227.4	227.5	227.8	227.9	228.1	228.1	228.2
17	227.9	227.4	227.4	227.1	227.2	227.4	227.5	227.8	227.9	228.1	228.1	228.2
18	227.9	227.5	227.3	227.1	227.2	227.4	227.5	227.8	227.9	228.1	228.2	228.2
19	227.8	227.5	227.3	227.1	227.1	227.3	227.5	227.8	227.9	228.1	228.2	228.2
20	227.8	227.6	227.3	227.1	227.1	227.3	227.5	227.8	228.0	228.1	228.2	228.2
21	227.8	227.5	227.3	227.1	227.1	227.3	227.5	227.8	228.1	228.1	228.2	228.2
22	227.8	227.6	227.3	227.1	227.1	227.3	227.5	227.8	228.1	228.1	228.2	228.2
23	227.8	227.5	227.3	227.2	227.1	227.3	227.5	227.8	228.1	228.0	228.2	228.1
24	227.8	227.5	227.3	227.2	227.1	227.4	227.5	227.8	228.1	228.0	228.2	228.1
25	227.8	227.5	227.2	227.2	227.1	227.4	227.5	227.8	228.1	228.0	228.2	228.1
26	227.8	227.5	227.2	227.2	227.1	227.4	227.5	227.8	228.1	228.0	228.2	228.1
27	227.8	227.5	227.2	227.2	227.1	227.4	227.5	227.8	228.1	228.0	228.2	228.1
28	227.8	227.5	227.2	227.2	227.2	227.4	227.5	227.8	228.1	228.0	228.2	228.1
29	227.8	227.5	227.2	227.2	227.2	227.4	227.5	227.8	228.1	228.0	228.2	228.1
30	227.7		227.2	227.2	227.2	227.4	227.6	227.8	228.1	228.0	228.2	228.1
31	227.7		227.2		227.2		227.6	227.8		228.0		228.1
Avg.	227.9	227.6	227.3	227.2	227.2	227.3	227.5	227.7	227.9	228.1	228.1	228.2

Current Year 1988			Period 1935-1988		
Month	Ø Extreme Elevation Feet		Elevation Feet		
	High	Low	# Average	# Maximum	! Minimum
Jan.	227.7	228.0	235.65	227.4	249.3
Feb.	227.4	227.7	235.34	227.1	248.8
Mar.	227.2	227.5	235.08	227.0	248.6
Apr.	227.1	227.2	234.89	226.9	248.7
May	227.1	227.2	234.87	226.8	248.5
June	227.2	227.4	235.02	227.0	248.8
July	227.4	227.6	235.19	227.1	249.1
Aug.	227.6	227.8	235.38	227.2	249.4
Sept.	227.8	228.1	235.57	227.3	249.4
Oct.	228.0	228.1	235.65	227.4	249.8
Nov.	228.0	228.2	235.67	227.5	250.0
Dec.	228.1	228.2	235.55	227.5	249.6
Yearly	227.1	228.2	235.32	227.1	250.0

Area and Capacity Table		
Elevation Feet Below M.S.L.	Area Acres	Capacity Acre-Feet
277.7	0	0
274.0	20,600	25,700
270.0	62,900	188,700
266.0	94,600	510,600
260.0	122,600	1,170,000
256.0	134,700	1,684,000
252.0	148,800	2,250,000
244.0	179,700	3,562,000
240.0	196,900	4,315,000
235.0	221,800	5,360,000
230.0	235,800	6,504,000
220.0	262,000	8,993,000
210.0	288,500	11,740,000
200.0	315,500	14,760,000

Ø Mean daily # Mean monthly ! Reading near first day of month

CHEMICAL ANALYSES OF WATER SAMPLES

The tables below are based on samples collected and analyzed by the State of California Department of Water Resources. New River samples prior to 1985 collected and analyzed by the U. S. Geological Survey. Beginning December 1971, not all constituents analyzed.

Samples from the Alamo River are taken north of the international boundary at upstream end of box culvert under the All-American Canal. Flow at this point includes drainage flows across international boundary and flows from drain intercepts along toe of south bank of All-American Canal. Samples from New River are taken from the right bank at road bridge 450 feet north of international boundary. Records of sampling extend from April 1951 through 1988.

ALAMO RIVER

1988 Date	Time Std.	Streamflow Momentary Sec.-Ft.	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO3) mg/L	Sulfate ion (SO4) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Solids Dissolved (Calculated) mg/L
Mar. 15	1030	4.35	4,310	8.0	808	853	954	3,030
June 14	1655	3.52	3,800	7.8	159	127	30	303
Sep. 13	1230	1.92	5,560	8.0	1,000	876	1,180	3,350
Dec. 20	0940	2.75	5,140	8.0	625	986	1,060	3,600

NEW RIVER

1988 Date	Time Std.	Streamflow Momentary Sec.-Ft.	Specific Conductance Micromhos	pH Units	Hardness, Total (as CaCO3) mg/L	Sulfate ion (SO4) Dissolved mg/L	Chloride ion (Cl) Dissolved mg/L	Solids Dissolved (Calculated) mg/L
Mar. 3	0940	329	5,280	7.8	874	687	1,390	3,580
June 14	1015	265	4,160	7.8	207	226	42	364
Sep. 13	1355	219	4,880	8.0	976	734	1,110	3,180
Dec. 20	0855	397	3,640	7.4	773	556	791	2,380

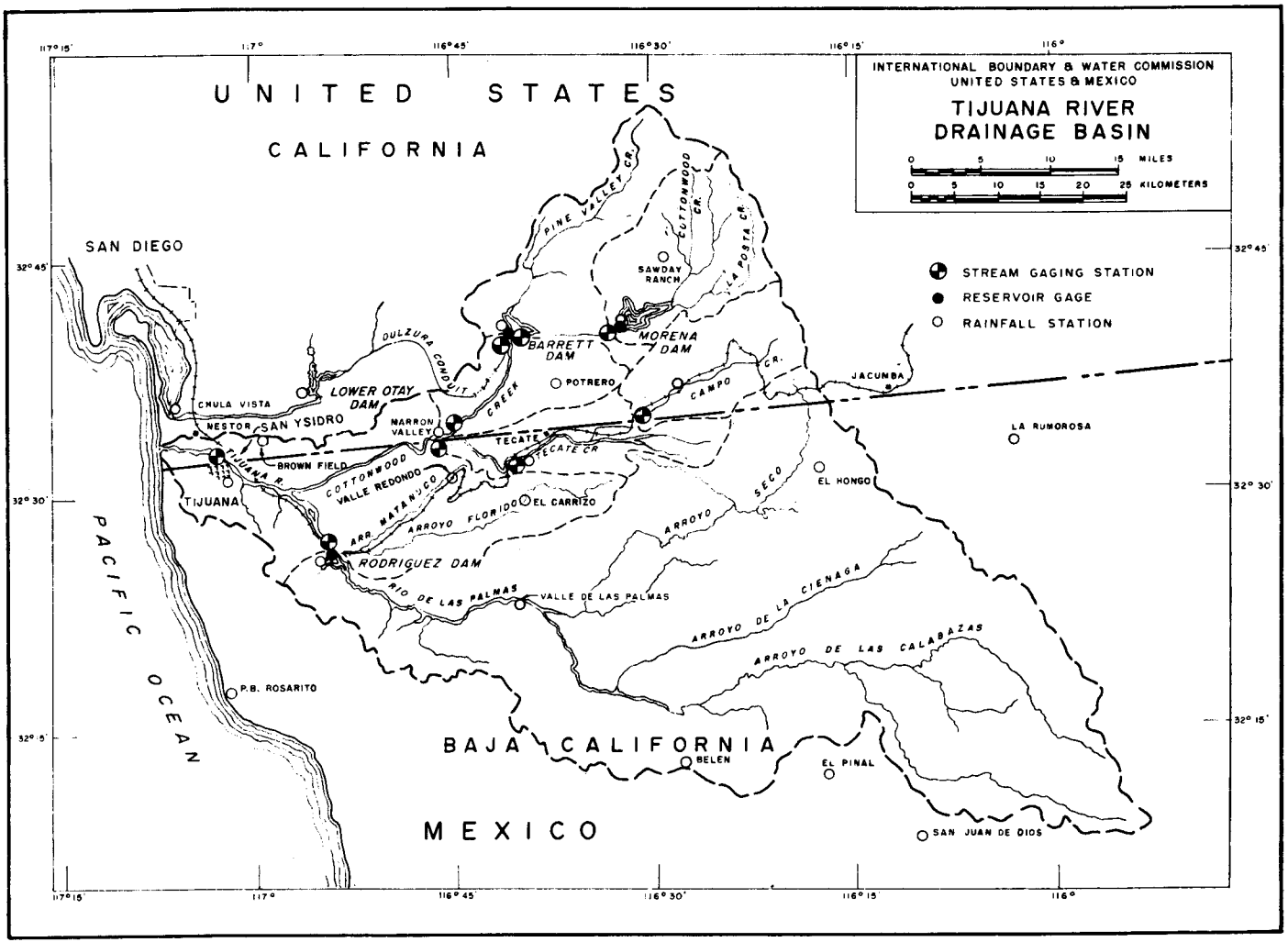
SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following table shows specific conductance of individual water samples from the New River in Mexico at the international boundary. Samples were taken by the Mexican Section of the Commission, who also made the determinations.

New River at International Boundary

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROMHOS/CM @ 25 DEG C - 1988

January		March		April		June		August		September		November	
6	3,260	2	5,000	27	4,450	15	4,800	3	4,850	21	5,500	9	4,800
13	4,500	9	6,820	May		22	4,690	10	6,000	28	4,900	16	4,400
20	5,850	16	6,470	4	4,930	29	5,180	17	4,000	October		23	4,200
27	3,930	23	5,150	11	4,860	July		24	2,900	5	5,800	30	4,300
February		April		18	5,660	6	4,490	31	4,150	12	5,010	December	
3	4,410	6	4,900	June		13	4,440	September		19	4,700	7	4,200
10	4,260	13	4,850	1	4,520	20	5,000	7	4,900	26	4,200	16	4,000
17	5,030	20	4,610	8	4,500	27	4,600	14	6,500	November		21	4,400
24	3,090									2	4,500	28	4,000


INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES & MEXICO
TIJUANA RIVER
DRAINAGE BASIN
0 5 10 15 MILES
0 5 10 15 20 25 KILOMETERS
STREAM GAGING STATION
RESERVOIR GAGE
RAINFALL STATION
UNITED STATES
CALIFORNIA
MEXICO
BAJA CALIFORNIA
PACIFIC OCEAN
SAN DIEGO
CHULA VISTA
NESTOR
SAN YSIDRO
TIJUANA
BROWN FIELD
TIJUANA R.
LOWER OTAY DAM
OTAY CREEK
DULZURA CONDUIT
BARRETT DAM
MORENA DAM
PINE VALLEY CR.
CUTTONWOOD CR.
LA POSTA CR.
SAWDAY RANCH
POTRERO
CAMPO
JACUMBA
LA RUMOROSA
EL HONGO
SECO
NARROW VALLEY
TECATE
TECATE CR.
COTTONWOOD
VALLE REDONDO
ARR. MATANUCO
ARROYO FLORIDO
EL CARRIZO
RODRIGUEZ DAM
RIO DE LAS PALMAS
VALLE DE LAS PALMAS
ARROYO DE LA CIENAGA
ARROYO DE LAS CALABAZAS
P.B. ROSARITO
BELEN
EL PINAL
SAN JUAN DE DIOS
117°15'
117°
116°45'
116°30'
116°15'
116°
32°45'
32°30'
32°15'
32°5'

11-0100.00 COTTONWOOD CREEK ABOVE MORENA DAM, CALIFORNIA

DESCRIPTION: Staff gage located on east side of outlet tower immediately upstream from face of Morena Dam. The dam is located on Cottonwood Creek 1.8 miles (2.9 km) upstream from the mouth of Hauser Creek, 8.5 miles (13.7 km) upstream from Barrett Dam, and about 20 miles (32.2 km) upstream from the international boundary. The zero of the gage is 2,882.4 feet (878.56 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Reservoir inflows shown below were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall, by the International Boundary and Water Commission, United States Section. They represent all water reaching Morena Reservoir, including rainfall on reservoir water surface. Basic data were furnished by the city of San Diego, California. Records April 1911 through 1988.

REMARKS: Storage began in Morena Reservoir March 1910. Reservoir capacity and area ratings date from 1910 when Morena Dam was completed. Records for 1988 computed on basis of area-capacity curves determined from 1948 resurvey. Various changes have been made to the spillway section since construction of the dam. Elevation of the present crest of ungated spillway is 157.00 feet (47.85 m), gage datum. Reservoir capacity at spillway crest, 1948 survey, is 50,210 acre-feet (61,934,000 m3). The entire capacity of Morena Reservoir is used to furnish a part of the water supply of the city of San Diego, California. Water is released from Morena Reservoir down Cottonwood Creek to Barrett Reservoir as required.

EXTREMES: Maximum monthly inflow since 1937, 45,274 acre-feet (55,845,000 m3), March 1983. Prior to 1937, maximum monthly inflow, 37,200 acre-feet (45,886,000 m3), January 1916; minimum no flow during parts of many years.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1937-1988		
		Average	Maximum	Minimum
January	1,231	707	7,472	0
February	799	2,058	33,569	8.0
March	428	3,037	45,274	19.3
April	732	1,714	23,130	3.3
May	308	866	15,113	0
June	70.0	441	8,247	0
July	268	302	6,203	0
August	214	260	7,228	0
September	19.0	173	5,133	0
October	27.0	159	3,905	0
November	84.0	263	4,567	0
December	477	693	7,679	4.4
Yearly	4,657	10,673	143,966	121
	Thousands of Cubic Meters			
	5,744	13,165	177,579	149

11-0105.00 COTTONWOOD CREEK BELOW MORENA DAM, CALIFORNIA

DESCRIPTION: Two water-stage recorders, one on the upstream side of the southeast abutment of Morena Dam for measuring head on the spillway crest and one immediately below the dam with a rectangular control weir for measuring ordinary reservoir releases, and cableway located about 0.8 mile (1.3 km) downstream from the dam, Discharge measurements made at the cableway include leakage, controlled releases, and spillway discharges.
RECORDS: Monthly records shown below represent the water available immediately below Morena Dam, consisting of spillway waste, draft, and leakage from the dam. They are computed by the International Boundary and Water Commission, United States Section, from basic data furnished by the city of San Diego, California. Records available: January 1911 through 1988.
REMARKS: Flows at this station are regulated by Morena Dam; storage began March 1910. Water is released from Morena Reservoir as required and flows down the natural channel of Cottonwood Creek to Barrett Reservoir. There are no major diversions above Morena dam.
EXTREMES: Maximum monthly discharge since 1937, 45,088 acre-feet (55,615,000 m3) March 1983. Prior to 1937, maximum monthly discharge, 21,400 acre-feet (26,397,000 m3), February 1916; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1937-1988		
		Average	Maximum	Minimum
January	126	195	2,094	0
February	145	879	15,926	0
March	174	1,712	45,088	0
April	89.0	1,343	22,829	0
May	137	693	14,674	0
June	175	499	7,507	0
July	258	311	5,056	0
August	304	296	6,435	0
September	214	339	5,880	0
October	255	187	3,761	0
November	524	219	4,111	0
December	1,625	447	7,377	0
Yearly	4,026	7,120	136,550	0
	Thousands of Cubic Meters			
	4,966	8,782	168,432	0

11-0110.00 COTTONWOOD CREEK ABOVE BARRETT DAM, CALIFORNIA

DESCRIPTION: Staff gage located immediately upstream from face of dam on west side of outlet tower. Barrett Dam is located on Cottonwood Creek 8.5 miles (13.7 km) downstream from Morena Dam, 1 mile (1.6 km) downstream from the mouth of Pine Valley Creek, and about 12 miles (19.3 km) upstream from the international boundary. Zero of gage is 1,446.12 feet (440.78 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Records reported below represent all water reaching Barrett Dam from the sub-basin below Morena Dam, including rainfall on the reservoir water surface. Leakage, releases, and spills from Morena Reservoir are not included. The inflows were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall furnished by the city of San Diego, California. Records available: January 1921 through 1988. Records of stream flow for a station at the dam site are also available for the periods 1906-1915 and 1917-1920.

REMARKS: Storage began at Barrett Reservoir in January 1921. The area-capacity-elevation curves used in the inflow calculations are dated 1948, 1951, and 1955 and were furnished by the city of San Diego, California. Capacity of reservoir at top of flash gates on spillway (gage height 168.88 feet (51.47 m)) is 44,755 acre-feet (55,205,000 m3). Capacity at spillway crest (gage height 160.88 feet (49.04 m)) is 37,950 acre-feet (46,811,000 m3). Dead storage, 719 acre-feet (887,000 m3) below lowest outlet (gage height (58.88 feet) (17.95 m) is included in these capacities. The entire capacity of Barrett Reservoir is used to furnish a part of the water supply of the city of San Diego, California.

EXTREMES: Maximum monthly discharge since 1937, 54,755 acre-feet (67,540,000 m3) February 1980. Prior to 1937, maximum monthly discharge, 54,800 acre-feet (67,595,000 m3) February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1937-1988		
		Average	Maximum	Minimum
January	1,734	797	4,926	5.2
February	760	2,706	54,755	7.6
March	416	4,270	45,700	14.1
April	577	2,008	21,630	10.2
May	41.9	825	8,311	0
June	0	357	3,906	0
July	.5	194	1,687	0
August	5.1	120	596	0
September	.4	124	759	0
October	1.1	100	645	.1
November	22.7	187	1,241	0
December	268	555	5,549	1.7
Yearly	3,827	12,243	114,330	129
	Thousands of Cubic Meters			
	4,720	15,101	141,024	159

11-0114.90 DULZURA CONDUIT BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder 0.5 mile (0.8 km) downstream from Barrett Dam on right bank of Dulzura Conduit 50 feet (15.2 m) upstream from road crossing to Barrett Dam. Elevation of gage has not been determined.
RECORDS: Computed on basis of head on control section of flume, as measured by water-stage recorder, and rating curve determined from current meter measurements. Records obtained and furnished by the city of San Diego, California. Records available: January 1909 through 1988.
REMARKS: Barrett Dam was completed in 1921. Prior to this date the intake of Dulzura Conduit was located 1.5 miles (2.4 km) upstream. The conduit carries diversions from Barrett Reservoir on Cottonwood Creek westerly across the divide into Otay Reservoir for municipal use by the city of San Diego. Prior to September 30, 1958, station was located 8 miles (12.9 km) along the conduit from Barrett Dam, being reported as "Dulzura Conduit near Dulzura;" and the draft from Barrett Reservoir was computed from the discharges obtained at the conduit gaging station, multiplied by the factor 1.05 to allow for channel loss in the reach from the reservoir to the gaging station.
EXTREMES: Since 1937: Maximum mean daily discharge, 55 second-feet (1.56 m3/sec) on March 15, 1954; minimum discharge, no flow for long periods on many occasions.

Mean Daily Discharge in Second-Feet 1988 — Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	17.5	22.5	19.1	20.0	0	25.3	22.3	0	0	27.5	19.8	6.4
2	17.5	22.9	18.9	20.6	0	24.3	21.9	0	0	26.9	18.5	6.5
3	17.3	22.7	18.9	20.4	0	24.3	21.6	0	0	26.9	16.4	2.9
4	17.3	22.9	19.1	20.4	0	24.3	20.8	0	0	26.9	14.1	2.9
5	17.5	22.7	19.1	20.6	0	24.3	20.4	0	0	28.2	10.9	3.0
6	17.5	22.5	20.2	21.8	0	24.3	20.0	0	1.4	27.8	8.4	3.0
7	17.3	22.7	20.0	20.8	0	24.1	20.0	0	1.4	27.3	6.6	3.0
8	30.5	22.7	19.8	20.8	0	24.1	20.0	0	3.6	27.3	5.8	3.1
9	30.3	22.7	19.3	21.2	0	23.5	22.3	0	8.1	27.1	6.1	3.1
10	30.3	22.7	19.3	21.2	0	23.3	24.7	0	0	26.7	5.3	3.1
11	30.3	22.9	19.3	21.2	0	23.3	24.7	0	0	26.7	4.6	3.1
12	30.5	22.3	19.8	21.0	0	23.3	25.9	0	0	26.7	4.1	3.1
13	30.1	22.3	19.8	21.0	0	23.1	25.7	0	8.9	26.1	3.8	3.1
14	30.1	22.5	19.8	20.0	0	23.1	25.5	0	16.2	26.1	3.4	3.1
15	30.1	22.7	20.2	20.0	0	25.5	24.7	0	22.5	25.7	3.2	3.3
16	29.8	22.7	20.2	18.9	0	25.5	24.5	0	25.9	25.5	2.7	3.4
17	29.8	21.0	20.4	0	0	25.5	24.5	0	25.9	25.5	2.7	3.4
18	31.1	20.4	21.0	0	0	25.1	24.1	0	25.5	25.5	2.7	3.4
19	29.6	20.6	22.1	0	0	24.9	22.1	0	25.3	25.3	2.3	3.4
20	29.6	20.4	22.7	0	8.7	24.7	21.9	0	25.1	25.1	2.1	3.5
21	29.0	19.5	23.3	0	15.3	24.7	21.9	0	24.9	24.7	2.0	3.6
22	25.7	19.5	21.4	0	24.3	24.9	26.9	0	24.7	24.3	1.9	3.6
23	24.7	19.5	20.4	0	24.1	24.9	41.0	0	24.3	24.3	1.4	3.6
24	24.9	19.3	21.4	0	23.9	24.5	40.8	0	24.3	23.7	1.4	3.7
25	24.3	19.1	21.8	0	23.7	24.3	0	0	23.7	23.5	1.9	3.7
26	24.5	19.3	22.3	0	26.7	23.9	0	0	23.5	22.5	2.8	3.8
27	23.3	19.3	22.1	0	26.3	23.9	0	0	22.5	24.3	2.7	3.8
28	22.7	19.1	22.5	0	26.3	23.7	0	0	24.3	23.3	2.7	3.8
29	22.7	19.1	22.5	0	25.7	23.3	0	0	23.9	23.3	4.4	3.9
30	22.7		20.0	0	25.3	23.3	0	0	27.8	22.3	5.8	3.9
31	22.9		20.4		25.3		0	0		21.2		4.0
Sum	781.4	618.5	637.1	329.9	275.6	727.2	588.2	0	433.7	788.2	170.5	111.2

Current Year 1988									Period 1937-1988		
Month	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			18	31.1	! 3	17.3	25.2	1,550	425	2,350	0
Feb.			! 2	22.9	!25	19.1	21.3	1,227	442	2,130	0
Mar.			21	23.3	! 2	18.9	20.6	1,264	562	2,330	0
Apr.			6	21.8	!17	0	11.0	654	794	2,860	0
May			26	26.7	! 1	0	8.9	547	927	3,040	0
June			!15	25.5	!13	23.1	24.2	1,442	973	2,920	0
July			23	41.0	!25	0	19.0	1,167	850	2,920	0
Aug.				0		0	0	0	787	2,820	0
Sept.			30	27.8	! 1	0	14.5	860	646	2,320	0
Oct.			5	28.2	31	21.2	25.4	1,563	551	2,450	0
Nov.			1	19.8	!23	1.4	5.7	338	554	2,760	0
Dec.			2	6.5	! 3	2.9	3.6	221	498	2,305	0
Yearly				41.0		0	14.9	10,833	8,009	27,170	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				1.16		0	0.42	13,362	9,879	33,514	0

ø Mean daily ! And other days

11-0111.00 COTTONWOOD CREEK BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located about 2.5 miles (4.0 km) downstream from Barrett Dam and 0.5 mile (0.8 km) upstream from Rattlesnake Canyon for measuring Barrett Dam spills; and staff gage and control weir located immediately below the dam for measuring leakage. The elevation of the gage is about 1,000 feet (305 m) (from topographic map).

RECORDS: Data furnished by the city of San Diego, California. Prior to January 1953, the records were furnished by the city of San Diego and reviewed and revised by the United States Section of the Commission. The recorder is to be operated only when Barrett Reservoir is near or above spillway level. Spillway discharges have occurred in May 1943, March, April 1979, January to May of 1980, April, December 1982, and the entire year of 1983. Spillway discharges included in the period record below were computed by the city of San Diego from the head on the spillway crest, read on the reservoir gage, and applied to a broad-crested weir formula. Records available: January 1921 through 1988. Storage began in Barrett Reservoir in January 1921.

REMARKS: Records reported below represent the water available in the natural channel of Cottonwood Creek immediately below Barrett Dam. Records of draft from Barrett Reservoir are not included, inasmuch as all releases are made to Dulzura Conduit, which transports water outside the basin. Leakage is mainly through the spillway gates.

EXTREMES: Maximum monthly discharge since 1937, 90,618 acre-feet (111,775,000 m3) March 1983. Prior to 1937, maximum monthly discharge 38,400 acre-feet (47,366,000 m3) February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1937-1988		
		Average	Maximum	Minimum
January	0	194	6,048	0
February	0	1,820	70,318	0
March	0	3,492	90,618	0
April	0	1,990	36,820	0
May	0	843	22,933	0
June	0	384	10,947	0
July	0	143	4,306	0
August	0	96.3	3,410	0
September	0	8.8	298	0
October	0	3.8	123	0
November	0	80.6	4,135	0
December	0	124	4,911	0
Yearly	0	9,180	206,002	0
	Thousands of Cubic Meters			
	0	11,323	254,099	0

11-0120.00 COTTONWOOD CREEK ABOVE TECATE CREEK NEAR DULZURA, CALIFORNIA

DESCRIPTION: Water-stage recorder and cableway located 1.6 miles (2.6 km) upstream from the international land boundary between the United States and Mexico, 0.8 mile (1.3 km) upstream from the confluence with Tecate Creek, and 5.1 miles (8.2 km) south of Dulzura, California. Low water discharge measurements are made by wading at the gage; high water measurements are made from the cableway, which is located 700 feet (213 m) downstream from the gage. Zero of the gage is 569.40 feet (173.55 m) above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1988.

REMARKS: Flow is largely controlled by Barrett and Morena Reservoirs, 10 (16.1 km) and 18 miles (29.0 km), respectively, upstream from this station.

EXTREMES: Maximum discharge 11,700 second-feet (331 m3/sec) February 21, 1980 (gage height 11.15 feet) (3.40 m). Minimum discharge, no flow during part of each year.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.84	2.6	3.1	0.18	1.8	0.03	0	0	0	0	0	0
2	.73	10	5.2	.17	1.5	0	0	0	0	0	0	0
3	.73	38	4.3	.16	1.0	0	0	0	0	0	0	0
4	.65	15	3.3	.17	.77	0	0	0	0	0	0	0
5	1.3	11	3.0	.17	.64	0	0	0	0	0	0	0
6	1.9	8.7	2.8	.14	.50	0	0	0	0	0	0	0
7	1.2	7.5	2.7	.12	.47	0	0	0	0	0	0	0
8	.96	6.6	2.4	.11	.49	0	0	0	0	0	0	0
9	.86	6.0	2.2	.09	.45	0	0	0	0	0	0	0
10	.84	5.5	2.2	.06	.40	0	0	0	0	0	0	0
11	.75	5.1	2.1	.05	.30	0	0	0	0	0	0	0
12	.69	4.6	1.9	.05	.22	0	0	0	0	0	0	0
13	.58	4.3	1.8	.07	.18	0	0	0	0	0	0	0
14	.51	4.0	1.7	.20	.16	0	0	0	0	0	0	0
15	.50	3.6	1.7	1.5	.16	0	0	0	0	0	0	0
16	.56	3.5	1.7	.82	.17	0	0	0	0	0	0	0
17	14	3.2	1.6	1.0	.17	0	0	0	0	0	0	0
18	160	3.0	1.3	1.1	.18	0	0	0	0	0	0	0
19	35	2.9	1.1	.96	.16	0	0	0	0	0	0	0
20	17	2.6	1.0	3.2	.11	0	0	0	0	0	0	0
21	12	2.5	.88	5.6	.08	0	0	0	0	0	0	.02
22	8.8	2.4	.85	6.0	.05	0	0	0	0	0	0	.10
23	7.1	2.4	.80	5.4	.03	0	0	0	0	0	0	.08
24	6.0	2.3	.69	4.0	0	0	0	0	0	0	0	.08
25	4.8	2.2	.46	3.3	0	0	0	0	0	0	0	.96
26	4.0	2.2	.38	2.9	.02	0	0	0	0	0	0	.51
27	3.6	2.2	.34	2.6	.01	0	0	0	0	0	0	.19
28	3.3	2.2	.30	2.4	0	0	0	0	0	0	0	.22
29	3.0	2.3	.23	2.4	.07	0	0	0	0	0	0	.14
30	2.9		.23	2.1	.13	0	0	0	0	0	0	.11
31	2.7		.23		.09		0	0		0		.11
Sum	297.80	168.4	52.49	47.02	10.31	0.03	0	0	0	0	0	2.52

Month	Current Year 1988							Period 1937-1988		
	Extreme Gage Feet		ø Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low				Average	Maximum	Minimum
	High	Low	Day		Day						
Jan.			18	160	15	0.50	9.6	591	500	11,918	0
Feb.			3	38	125	2.2	5.8	334	2,374	69,019	0
Mar.			2	5.2	129	.23	1.7	104	3,818	88,707	0
Apr.			22	6.0	111	.05	1.6	93.3	2,291	40,240	0
May			1	1.8	124	0	.33	20.4	826	18,192	0
June			1	.03	1 2	0	0	.1	274	5,919	0
July				0		0	0	0	73.2	2,918	0
Aug.				0		0	0	0	57.6	1,500	0
Sept.				0		0	0	0	14.6	645	0
Oct.				0		0	0	0	7.8	236	0
Nov.				0		0	0	0	42.6	1,117	0
Dec.			25	.96	1 1	0	.08	5.0	169	2,569	0
Yearly				160		0	1.6	1,148	10,448	178,808	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				4.53		0	0.05	1,416	12,887	220,556	0

ø Mean daily

! And other days

11-0125.00 CAMPO CREEK NEAR CAMPO, CALIFORNIA

DESCRIPTION: Water-stage recorder and broad-crested weir on left bank, 0.5 mile (0.8 km) upstream from the international land boundary between the United States and Mexico, just upstream from the bridge on California State Highway 94, 3.5 miles (5.6 km) southwest of Campo, California. Zero of gage is 2,178.92 feet (664.13 m) above mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on current meter measurements and observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1988.
REMARKS: Campo Creek originates in the United States and flows southwestward into Mexico where it joins Tecate Creek. The flow at this station was partially regulated by a small conservation reservoir, 1 mile (1.6 km) upstream, from August 1956 to February 20, 1980, when it was destroyed by a flood.
EXTREMES: Maximum discharge, 895 second-feet (25.3 m3/sec), March 24, 1983 (gage height 5.39 feet (1.64 m) present datum), from rating curve extended above 110 second-feet 3.12 m3/sec) on basis of velocity-depth relation and cross section area at the control. Minimum discharge, no flow during part of most years.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.67	2.4	3.2	1.0	0.80	0.53	0.13	0.11	0.09	0.10	0.14	0.19
2	.64	18	7.0	1.0	.74	.52	.13	.12	.08	.11	.16	.19
3	.65	34	5.0	1.0	.72	.49	.12	.13	.08	.11	.15	.19
4	.66	5.5	3.0	.95	.71	.49	.11	.14	.07	.10	.13	.19
5	1.1	3.9	2.5	.90	.74	.48	.12	.12	.06	.11	.10	.19
6	3.2	3.2	2.0	.85	.83	.50	.13	.11	.06	.12	.09	.19
7	2.7	2.9	2.0	.80	.84	.50	.13	.11	.10	.12	.11	.20
8	2.1	2.7	1.9	.70	.84	.47	.12	.11	.14	.09	.14	.19
9	1.7	2.6	1.8	.60	.81	.44	.12	.11	.17	.08	.15	.19
10	1.3	2.6	1.8	.50	.76	.41	.12	.10	.25	.08	.16	.19
11	1.2	2.3	1.7	.45	.70	.41	.12	.10	.29	.07	.17	.18
12	1.2	2.2	1.7	.50	.62	.40	.13	.11	.38	.08	.16	.19
13	.92	2.2	1.6	.52	.59	.34	.13	.11	.11	.09	.16	.20
14	.83	2.3	1.6	.58	.58	.29	.14	.10	.10	.14	.25	.22
15	.84	2.2	1.5	1.2	.53	.19	.14	.10	.10	.15	.20	.23
16	1.3	2.3	1.5	.90	.52	.22	.13	.09	.11	.14	.18	.26
17	18	2.2	1.5	.96	.53	.28	.12	.10	.13	.13	.19	.27
18	141	2.0	1.5	1.0	.54	.25	.14	.10	.15	.12	.19	.32
19	9.4	2.2	1.4	1.0	.33	.25	.18	.09	.13	.18	.19	.32
20	5.2	1.8	1.4	2.4	.44	.26	.16	.11	.16	.17	.19	.27
21	4.2	1.7	1.4	7.4	.43	.23	.20	.11	.18	.15	.18	.33
22	3.4	1.9	1.3	8.4	.43	.20	.22	.10	.16	.15	.19	.27
23	3.1	2.1	1.3	5.3	.43	.19	.18	.14	.15	.15	.19	.27
24	3.0	2.1	1.3	3.4	.46	.19	.12	.15	.15	.14	.22	.28
25	2.7	2.1	1.3	2.5	.49	.18	.08	.14	.15	.14	.34	.69
26	2.5	2.1	1.2	1.7	.49	.16	.06	.14	.15	.15	.30	.42
27	2.5	2.3	1.2	1.2	.51	.13	.07	.11	.12	.15	.22	.32
28	2.5	2.3	1.2	.96	.54	.12	.09	.09	.11	.16	.21	.33
29	2.4	2.2	1.1	.88	.58	.12	.09	.10	.08	.18	.19	.29
30	2.3		1.1	.85	.57	.12	.11	.11	.09	.17	.19	.27
31	2.3		1.1		.55		.10	.09		.15		.27
Sum	225.51	118.3	59.1	50.40	18.65	9.36	3.94	3.45	4.10	3.98	5.44	8.11

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Ø Extreme Second-Feet High Day	High	Low Day	Low	Average Second-Feet	Total Acre-Feet	Period 1937-1988 Acre-Feet Average	Maximum	Minimum
Jan.			18	141	2	0.64	7.3	447	189	1,087	0
Feb.			3	34	21	1.7	4.1	235	376	4,287	0
Mar.			2	7.0	129	1.1	1.9	117	625	9,394	0
Apr.			22	8.4	11	.45	1.7	100	427	7,204	0
May			! 7	.84	19	.33	.60	37.0	201	3,207	0
June			1	.53	128	.12	.31	18.6	96.0	1,811	0
July			22	.22	26	.06	.13	7.8	56.3	1,236	0
Aug.			24	.15	116	.09	.11	6.8	57.6	1,628	0
Sept.			12	.38	! 5	.06	.14	8.1	41.8	984	0
Oct.			118	.18	11	.07	.13	7.9	50.1	879	0
Nov.			25	.34	6	.09	.18	10.8	96.2	1,234	0
Dec.			25	.69	11	.18	.26	16.1	155	1,583	0
				141		0.06	1.4	1,012	2,371	31,325	0
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				3.99		0	0.04	1,248	2,925	38,639	0

Ø Mean daily ! And other days

11-0130.00 COTTONWOOD CREEK NEAR INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and cableway, 0.6 mile (1.0 km) upstream from the international land boundary between the United States and Mexico, 0.5 mile (0.8 km) downstream from the confluence of Cottonwood Creek and Tecate Creek, and 5.5 miles (8.9 km) south of Dulzura, California. This station is published by the U. S. Geological Survey under the name "Tijuana River near Dulzura, California." Low water discharge measurements are made by wading at the gage. The zero of the gage is 542.42 feet (165.33 m) above mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1988.
REMARKS: Flow is partially controlled by Barrett and Morena Reservoirs, 11 (17.7 km) and 19 miles (30.6 km), respectively, upstream from this station. The flow at this station represents the amount of water passing the Marron Dam site.
EXTREMES: Maximum discharge, 13,600 second-feet (385 m3/sec), March 3, 1983 (gage height 7.03 feet); (2.14 m); maximum gage height, 11.19 feet (3.41 m) February 18, 1980; minimum discharge, no flow for part of most years.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.9	8.6	15	2.9	6.2	1.4	1.2	1.0	1.1	* 1.4	3.4	* 3.0
2	5.4	44	25	2.7	2.8	1.1	1.2	1.0	1.1	* 1.4	2.9	* 3.5
3	6.4	157	13	2.8	1.7	1.0	1.2	.90	1.1	* 1.5	3.7	* 4.0
4	5.1	65	5.8	2.7	2.3	1.0	1.2	.90	1.1	* 1.6	1.2	* 3.0
5	12	43	3.3	3.3	1.0	1.1	1.2	.90	1.1	* 1.6	1.5	* 2.8
6	25	30	3.1	3.1	2.1	1.1	1.2	.90	1.1	* 1.7	1.6	* 2.1
7	16	23	2.8	3.0	2.2	1.1	1.2	.90	1.1	* 1.8	1.8	* 2.5
8	14	17	4.0	3.0	1.6	1.2	1.2	.90	1.1	* 1.8	2.8	* 3.0
9	13	18	5.9	2.9	.82	1.2	1.2	.90	1.2	* 1.9	1.9	* 3.5
10	11	10	3.5	2.5	1.4	1.7	1.2	.90	1.2	* 2.0	3.0	* 3.0
11	8.4	9.5	4.9	2.6	.93	2.0	1.2	.90	1.2	* 2.1	3.5	* 3.0
12	9.6	9.0	5.0	2.5	.81	1.4	1.2	.90	1.2	* 2.2	4.0	* 2.0
13	10	9.0	3.7	2.4	1.3	1.3	1.2	.90	1.2	* 2.3	3.1	* 2.5
14	8.6	9.5	4.0	2.3	.86	1.3	1.1	.90	1.2	* 2.4	1.3	* 3.0
15	9.8	9.0	7.7	2.3	.73	1.3	1.1	.90	1.2	* 2.4	2.9	* 3.5
16	11	9.0	8.9	2.2	.91	1.3	1.1	.90	1.2	* 2.5	3.4	* 4.5
17	83	9.0	4.6	2.2	1.2	1.3	1.1	.90	1.2	* 2.5	3.4	* 5.0
18	604	8.5	7.6	2.1	1.0	1.3	1.1	1.0	1.2	4.5	1.6	* 4.5
19	187	8.5	11	2.1	.90	1.3	1.1	1.0	1.2	5.0	2.9	* 5.5
20	100	8.0	12	15	.72	1.3	1.1	1.0	1.3	5.6	3.2	* 5.0
21	69	7.5	3.4	30	.70	1.3	1.0	1.0	1.3	5.4	1.7	* 6.5
22	48	8.0	2.9	32	.79	1.3	1.0	1.0	1.3	5.8	1.7	* 5.5
23	38	8.5	14	23	.78	1.3	1.0	1.0	1.3	5.6	1.6	* 6.0
24	30	8.5	18	15	.76	1.3	1.0	1.0	1.3	6.1	2.4	* 5.5
25	19	9.0	6.4	8.4	1.1	1.3	1.0	1.0	1.3	6.6	4.5	15 *
26	19	9.0	4.3	11	1.3	1.2	1.0	1.1	1.3	7.3	5.4	* 9.0
27	12	9.5	3.7	6.3	1.2	1.2	1.0	1.1	1.3	8.0	* 4.0	* 5.5
28	11	9.5	3.2	5.0	1.1	1.2	1.0	1.1	1.3	5.5	* 3.5	* 5.0
29	8.9	10	2.4	3.6	1.2	1.2	1.0	1.1	1.3	2.6	* 3.0	* 4.5
30	9.5		2.8	5.9	1.2	1.2	1.0	1.1	1.3	1.4	* 3.0	* 4.5
31	9.3		6.7		1.2		1.0	1.1		1.9		* 4.0
Sum	1,418.9	584.1	218.6	204.8	42.81	38.2	34.3	30.10	36.3	104.4	83.9	139.9

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Ø Extreme Second-Feet High Day	High	Low Day	Low	Average Second-Feet	Total Acre-Feet	Period 1937-1988 Acre-Feet Average	Maximum	Minimum
Jan.			18	604	4	5.1	46	2,814	1,031	20,792	0
Feb.			3	157	21	7.5	20	1,159	4,446	143,486	0
Mar.			2	25	29	2.4	7.1	434	6,639	133,180	0
Apr.			22	32	!18	2.1	6.8	406	3,166	51,060	0
May			1	6.2	21	.70	1.4	84.9	1,074	20,955	0
June			11	2.0	! 3	1.0	1.3	75.8	379	8,428	0
July			! 1	1.2	!21	1.0	1.1	68.0	154	3,497	0
Aug.			!26	1.1	! 3	.90	.98	59.7	155	5,494	0
Sept.			!20	1.3	! 1	1.1	1.2	72.0	48.3	1,144	0
Oct.			27	8.0	! 1	* 1.4	3.4	207	78.7	1,626	0
Nov.			26	5.4	4	1.2	2.8	166	200	3,568	0
Dec.			25	* 15	12	* 2.0	4.5	277	567	5,839	0
Yearly				604		0.70	8.0	5,823	17,938	288,517	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				17.1		0.02	0.23	7,183	22,126	355,880	0

Ø Mean daily ! And other days * Estimated

11-0131.00 INFLOWS TO RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Rodriguez Dam is located in Mexico on Rio de las Palmas, the principal tributary to the Tijuana River, about 5.6 miles (9.0 km) upstream from its confluence with Cottonwood Creek, 10.6 miles (17.0 km) upstream from the point where the Tijuana River crosses the international boundary between the United States and Mexico, and 9.9 miles (16.0 km) southeast of Tijuana, Baja California.

RECORDS: Computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall. Records obtained by the Ministry of Agriculture and Hydraulic Resources through May 1961; from June 1961 through March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana, Baja California, and from April 1966 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1988. Storage began in Rodriguez Reservoir on September 22, 1936.

REMARKS: Records of runoff represent all water reaching Rodriguez Reservoir, including rainfall on the reservoir water surface. Area-capacity-elevation rating for reservoir used in the computations is dated 1927 when the reservoir area was initially surveyed. Elevation of crest of spillway 380.08 feet (115.85 m) above mean sea level; at top of spillway gates 410.10 feet (125.00 m) above mean sea level. Reservoir capacity at spillway crest 74,885 acre-feet (92,370,000 m3); at top of spillway gates 111,880 acre-feet (138,000,000 m3).

EXTREMES: Maximum monthly inflow, 157,453 acre-feet (194,216,000 m3); February 1980; minimum, no flow during part of most years.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1938-1988		
		Average	Maximum	Minimum
January	2,583	2,133	54,820	0
February	1,323	5,991	157,453	5.8
March	291	10,191	139,893	4.2
April	217	3,201	77,790	0
May	159	630	11,460	0
June	90.8	204	4,661	0
July	72.1	97.3	1,464	0
August	333	63.2	770	0
September	392	65.8	466	0
October	51.7	81.1	350	0
November	104	170	1,940	0
December	137	895	15,686	8.4
Yearly	5,754	23,725	309,298	254
	Thousands of Cubic Meters			
	7,097	29,265	381,515	313

11-0132.00 DIVERSIONS FROM RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Sparling flow meter located immediately below the dam in the pipeline which carries water from Rodriguez Reservoir to Gate No. 1 (Poblado Presa) and to Gate No. 2 (City Aqueduct). Formerly, water for irrigation was also diverted to the North and South Canals.

RECORDS: Direct recording by Sparling flow meter. Records through May 1961 were obtained by the Ministry of Agriculture and Hydraulic Resources; from June 1961 to March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana; and from April 1966 through 1988 by the State of Baja California Commission of Public Services for Tijuana. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1988.

REMARKS: Beginning in January 1937, diversions for irrigation began from both sides for the Tijuana valley and for domestic use at the village by Rodriguez Dam and the city of Tijuana. Since February 1960, no water has been released for irrigation of farmlands.

EXTREMES: Maximum monthly diversion, 1,963 acre-feet (2,421,000 m3), July 1944; minimum, no flow March and April 1941, August 1960, December 1962, November and December 1988.

MONTHLY DISCHARGE IN ACRE-FEET

Month	Current Year 1988	Period 1937-1988		
		Average	Maximum	Minimum
January	1,398	382	1,596	1.5
February	1,297	383	1,429	0.8
March	1,347	443	1,613	0
April	1,239	537	1,602	0
May	1,290	667	1,676	1.8
June	1,193	737	1,857	1.9
July	1,141	777	1,963	1.9
August	1,043	719	1,859	0
September	666	619	1,527	1.9
October	59.5	550	1,618	1.9
November	0	460	1,563	0
December	0	431	1,596	0
Yearly	10,672	6,706	18,319	29.3
	Thousands of Cubic Meters			
	13,164	8,272	22,596	36.2

11-0133.00 TIJUANA RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder on top of north levee about 0.7 mile (1.1 km) downstream (north) from boundary, 1.1 miles (1.8 km) upstream from the new Dairy Mart Road bridge,and 1.4 miles (2.3 km) west of the international gate at San Ysidro, California. Zero of the gage is at mean sea level, U. S. C. & G. S. datum.
RECORDS: Based on current meter measurements, staff gage readings and record of gage heights. Records obtained and furnished by the United States Section of the Commission. Records available: May 1947 through 1988.
EXTREMES: Since May 1947: Maximum instantaneous discharge, 33,100 second-feet (937 m3/sec), February 21, 1980; minimum discharge, no flow during many years since 1951.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	54.6	35.8	11.3	18.4	15.0	10.1	* 9.6	* 7.4	6.8	10.0	8.1
2	4.0	1,140	463	11.7	18.4	18.4	11.1	10.1	8.4	8.1	8.9	* 8.9
3	3.8	1,330	20.2	11.7	17.4	14.3	12.3	36.6	8.2	7.7	9.8	8.9
4	4.2	243 *	18.4	11.8	16.3	16.6	11.6	11.2	7.7	7.9	9.4	8.9
5	9.1	26.8	18.5	11.9	15.6	16.1	* 10.4	12.7	7.2	8.1	8.9	8.4
6	9.9	28.8	17.8	11.8	18.2	* 14.4	10.5	14.1	6.5	8.1	8.7	7.9
7	27.8	31.5	18.3	10.3	17.0	12.8	10.3	14.7	5.7	8.1	8.5	8.1
8	25.0	28.9	16.9	11.5	15.6	12.7	10.5	* 11.9	5.9	8.5	9.8	8.2
9	24.4	# 29.8	16.2	12.4	* 16.9	11.1	10.0	10.5	* 6.4	9.4	10.5	9.0
10	18.4	# 22.1	17.5	11.9	15.5	11.2	9.5	10.2	7.3	9.2	10.4	8.3
11	11.7	# 18.5	16.9	* 11.5	15.3	12.1	8.5	12.0	8.0	* 9.1	10.4	7.5
12	7.6	21.5	16.8	12.0	15.8	11.9	7.9	* 11.8	8.1	8.9	10.3	7.4
13	7.7	25.3	16.5	11.5	14.3	12.2	9.0	10.1	9.2	8.9	11.1	8.1
14	8.6	22.6	16.7	* 17.1	14.0	12.3	8.2	9.8	8.3	* 9.1	* 46.6	7.5
15	14.9	18.0	17.1	205	12.9	12.5	* 9.7	10.5	9.8	9.0	11.9	10.4
16	19.8	15.7	17.1	18.2	13.3	12.7	9.2	9.1	9.8	9.9	10.9	51.9
17	763	16.1	* 16.1	17.1	13.8	* 12.3	9.0	8.7	9.8	8.9	9.3	9.1
18	1,670	16.5	15.4	19.0	12.8	11.6	9.8	* 8.9	10.0	8.9	9.3	15.5
19	804	16.2	16.4	17.0	* 12.9	10.3	9.5	9.1	* 8.9	8.4	10.9	13.0
20	160	14.8	15.8	594	11.4	9.9	9.4	8.4	8.9	7.7	10.2	9.5
21	80.0	16.5	14.8	450	11.5	10.1	10.1	8.9	9.3	7.7	10.2	19.1
22	48.8	14.6	13.7	152 *	11.9	10.7	10.1	9.3	9.0	8.6	8.9	* 9.9
23	28.8	13.6	13.4	16.5	11.9	10.5	10.3	8.8	9.4	8.9	9.5	13.1
24	33.0	16.4	13.0	14.1	12.0	* 9.8	* 10.0	8.5	8.7	* 7.6	8.8	10.8
25	26.5	16.5	13.1	23.5	11.8	10.6	10.3	9.1	7.2	7.7	* 79.1	409
26	29.5	15.0	13.2	21.1	12.9	11.2	9.7	* 10.9	* 7.0	9.1	13.4	47.4
27	28.9	14.5	12.8	19.6	12.0	11.7	10.9	8.9	7.7	8.9	9.4	15.5
28	27.0	15.8	11.7	18.5	12.8	11.7	10.8	8.5	8.1	8.9	9.9	129
29	25.9	15.6	11.7	18.3	18.3	12.5	11.6	9.0	7.6	11.8	8.5	17.2
30	24.9		11.7	* 18.4	17.5	10.3	10.7	9.5	6.1	8.2	8.7	13.7
31	28.8		* 10.3		15.8		9.9	9.3		8.4		12.7
Sum	3,979.5	3,259.2	946.8	1,790.7	454.2	369.5	310.9	340.7	241.6	266.5	402.2	922.0

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1947-1988 Acre-Feet Average	Maximum	Minimum
Jan.	42.48	39.14	18	2,640	4	2.4	128	7,893	2,873	72,441	0
Feb.	42.87	39.21	2	3,270	23	11.7	112	6,465	9,336	315,328	0
Mar.	42.42	39.15	2	2,550	31	9.8	30.5	1,878	12,477	293,494	0
Apr.	42.48	39.14	20	2,640	7	8.9	59.7	3,552	3,300	62,938	0
May	39.41	39.15	29	33.0	20	8.9	14.7	901	1,788	42,599	0
June	39.40	39.15	29	31.3	21	8.1	12.3	733	497	9,696	0
July	39.25	39.13	13	16.0	12	6.5	10.0	617	365	9,242	0
Aug.	39.67	39.13	3	70.0	26	7.3	11.0	676	516	17,092	0
Sept.	39.18	39.08	113	11.7	7	4.5	8.1	479	114	978	0
Oct.	39.29	39.10	29	21.0	1	5.2	8.6	529	191	2,713	0
Nov.	40.68	39.13	25	582	29	5.8	13.4	798	435	4,377	0
Dec.	42.32	39.15	25	2,400	!18	6.5	29.7	1,829	765	6,705	0
Yearly	42.87	39.08		3,270		2.4	36.3	26,350	32,657	595,739	0
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	13.07	11.91		92.6		0.07	1.03	32,502	40,282	734,832	0

* Discharge measurement made on this day ! And other days # Partly estimated

STORED WATER IN RESERVOIRS, TIJUANA RIVER BASIN

Data are presented below for all storage reservoirs in the Tijuana River Basin. The data represent contents on the last day of the month in acre-feet. The reservoir capacities indicated are total capacities at the top of the spillway gates in closed position on the controlled spillways of Barrett and Rodriguez Dams, and at spillway level for Morena Dam, which has had an uncontrolled spillway since the spillway gates were removed in 1942. The records of storage reported below for Morena, Barrett, and Rodriguez Reservoirs are based on the capacities as determined by the following surveys: Morena 1948; Barrett 1948, 1951, and 1955; and Rodriguez 1927, when the reservoir area was initially surveyed.

Records for Morena and Barrett Reservoirs are obtained and furnished by the city of San Diego and the U. S. Geological Survey. Records for Rodriguez Reservoir obtained and furnished by the State of Baja California Commission of Public Services for Tijuana.

Month	MORENA RESERVOIR, CALIFORNIA (Capacity 50,210)		BARRETT RESERVOIR, CALIFORNIA (Capacity 44,760)		RODRIGUEZ RESERVOIR, BAJA CALIFORNIA (Capacity 111,880)		TOTAL IN TIJUANA RIVER BASIN RESERVOIRS (Capacity 206,850)	
	1988	Average 1937-1988	1988	Average 1937-1988	1988	Average 1937-1988	1988	Average 1937-1988
Jan.	32,154	18,851	12,077	13,545	11,577	33,289	55,808	65,685
Feb.	32,536	19,921	11,676	14,790	11,450	34,550	55,662	69,261
Mar.	32,266	21,084	10,880	16,623	10,424	38,586	53,570	76,293
Apr.	32,524	21,201	10,773	17,070	9,007	38,731	52,304	77,002
May	32,042	21,029	10,244	16,587	7,674	38,208	49,960	75,824
June	31,207	20,538	8,697	15,808	6,380	37,109	46,284	73,455
July	30,302	20,034	7,413	15,010	5,127	35,687	42,842	70,731
Aug.	29,531	19,550	7,394	14,244	4,242	34,296	41,167	68,090
Sept.	28,763	19,028	6,430	13,790	3,861	33,327	39,054	66,145
Oct.	28,119	18,717	4,947	13,346	3,772	32,272	36,838	64,335
Nov.	27,507	18,615	4,787	13,008	3,825	31,962	36,119	63,585
Dec.	26,180	18,759	6,264	13,305	3,905	32,243	36,349	64,307
Average	30,261	19,777	8,465	14,761	6,752	35,022	45,478	69,560
Maximum	32,536	!# 61,670	12,077	!* 45,920	11,577	! 112,272	55,808	! 213,600
Minimum	26,180	!! 10	4,787	!! 106	3,772	!! 0	36,119	!! 1,264

\# March 31, 1941 - Prior to removal of spillway gates
* April 30, 1937 - Sandbags were placed on crest of spillway
! Maximum end of month storage for period of record
!! Minimum end of month storage for period of record

RAINFALL ON THE TIJUANA RIVER WATERSHED
IN INCHES

Tabulated below are monthly records of rainfall with averages for their periods of record at stations located in California and Baja California. Daily records, where available, are on file in the offices of the United States and Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listing of these stations following rainfall data.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Sawday Ranch, California		Campo, California	
	1988	Average 1906-1988	1988	Average 1907-1988	1988	Average 1951-1988	1988	Average 1950-1988	1988	Average 1900-1988
Jan.	3.60	3.72	4.32	3.38	* 2.61	2.77	4.29	3.31	3.49	3.00
Feb.	2.40	3.72	1.70	3.38	* 2.02	2.12	2.22	2.97	1.94	3.20
Mar.	.60	3.47	.80	3.16	1.00	2.81	.57	3.29	.72	2.81
Apr.	2.80	1.68	3.10	1.54	2.30	1.23	2.89	1.54	2.48	1.39
May	.20	.60	.48	.54	.20	.34	.12	.40	.36	.48
June	0	.12	0	.06	0	.05	0	.04	T	.07
July	.10	.38	0	.13	0	.04	1.18	.58	.02	.50
Aug.	.70	.55	0	.24	0	.13	1.16	.80	1.65	.55
Sept.	.30	.41	.02	.26	0	.27	#	.48	0	.35
Oct.	.10	.91	.06	.73	0	.42	0	.61	0	.66
Nov.	.50	1.64	1.31	1.52	2.00	1.46	.77	1.87	1.08	1.42
Dec.	3.00	3.17	2.61	2.83	2.40	2.32	2.68	2.53	2.12	2.46
Yearly	14.30	20.37	14.40	14.65	12.53	13.96		18.42	13.86	16.89

Month	Chula Vista, California		Lower Otay Dam, California		Brown Field, California					
	1988	Average 1930-1988	1988	Average 1906-1988	1988	Average 1964-1988				
Jan.	1.06	1.79	1.24	2.04	1.27	1.66				
Feb.	1.69	1.71	1.93	1.55	3.28	1.54				
Mar.	.75	1.70	1.06	2.14	1.21	2.07				
Apr.	2.33	.83	3.05	1.08	2.90	1.04				
May	.09	.23	.14	.42	.30	.20				
June	0	.04	0	.07	0	.06				
July	0	.02	0	.04	0	.04				
Aug.	0	.09	0	.12	0	.11				
Sept.	0	.19	0	.24	0	.18				
Oct.	0	.38	0	.39	0	.43				
Nov.	1.03	1.20	.86	1.41	1.04	1.63				
Dec.	1.93	1.64	1.92	1.60	1.86	1.77				
Yearly	8.88	9.82	10.20	11.10	11.86	10.73				

IN MEXICO

Month	La Rumorosa, Baja California		Valle Redondo, Baja California		Tecate, Baja California		Rodriguez Dam, Baja California		Valle de las Palmas, Baja California	
	1988	Average 1945-1988	1988	Average 1971-1988	1988	Average 1946-1959 1961-1988	1988	Average 1938-1988	1988	Average 1948-1988
Jan.	1.97	0.98	1.61	2.24	3.46	2.64	1.38	1.57	2.17	1.65
Feb.	.79	.63	1.61	2.32	1.34	1.89	.94	1.42	1.30	1.22
Mar.	.24	.75	0	2.44	.79	2.44	.94	1.61	.71	1.50
Apr.	2.91	.39	2.24	.94	3.03	1.10	2.64	.75	1.57	.63
May	0	.08	.08	.24	.31	.31	.20	.12	.08	.12
June	0	.04	0	.04	0	.12	0	.04	0	.04
July	0	.39	0	.08	0	.16	0	.04	.12	.08
Aug.	T	.71	0	.16	0	.24	0	.12	0	.20
Sept.	0	.35	0	.31	0	.16	0	.24	0	.24
Oct.	T	.35	0	.75	T	.47	.04	.39	.08	.35
Nov.	0	.59	.98	1.81	1.65	1.50	.63	1.02	.24	.91
Dec.	1.57	.79	2.20	1.73	#	2.09	2.24	1.57	1.61	1.14
Yearly	7.48	5.94	8.74	13.03	-	13.90	9.02	8.90	7.87	7.87

* Estimated # Missing record T Trace

RAINFALL ON THE TIJUANA RIVER WATERSHED
IN INCHES

IN MEXICO

Month	P. B. Rosarito, Baja California		El Pinal, Baja California		El Hongo, Baja California		El Carrizo, Baja California		Belen, Baja California	
	1988	Average 1967-1988	1988	Average 1964-1988	1988	Average 1980-1988	1988	Average 1980-1988	1988	Average 1965-1988
Jan.	1.26	1.73	2.99	2.95	2.40	1.65	1.38	1.69	2.56	2.40
Feb.	1.89	1.81	.94	3.39	1.30	2.05	.91	2.05	1.38	2.64
Mar.	#	1.65	.94	3.62	.59	2.76	.79	2.52	.98	2.80
Apr.	2.76	.79	4.09	1.73	1.93	.91	2.13	.91	3.50	1.14
May	.24	.24	.16	.35	.04	.16	.16	.16	0	.16
June	#	.04	0	.04	0	.04	#	.04	0	.08
July	#	.04	.43	.79	.20	.83	#	.16	0	.16
Aug.	.08	.08	.94	.91	1.14	1.26	#	.16	0	.28
Sept.	0	.20	T	.75	0	.31	#	.24	0	.39
Oct.	0	.43	T	.67	0	.67	#	.94	0	.67
Nov.	.87	1.26	1.02	2.09	.63	1.89	#	1.97	.75	1.73
Dec.	#	1.34	2.56	2.95	1.57	1.42	#	1.97	.51	2.05
Yearly	-	9.92	14.09	20.20	9.80	14.37	-	12.99	9.69	15.00

\# Missing record T Trace

LOCATION OF RAINFALL STATIONS ON THE TIJUANA RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1988.

IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
Barrett Dam, California	32° 41'	116° 40'	1,623	1907	City of San Diego
Brown Field, California	32° 34'	116° 59'	515	1964	City of San Diego
Campo, California	32° 38'	116° 28'	2,630	1877	County of San Diego
Chula Vista, California	32° 36'	117° 06'	9	1930	Chula Vista Fire Department
Lower Otay Dam, California	32° 37'	116° 56'	540	1906	City of San Diego
Marron Valley, California	32° 34'	116° 46'	550	1951	County of San Diego
Morena Dam, California	32° 41'	116° 31'	3,075	1906	City of San Diego
Potrero, California *	32° 37'	116° 36	2,400	1914	County of San Diego
Sawday Ranch, California	32° 45'	116° 29'	3,200	1950	William Tulloch

IN MEXICO

NAME OF STATION	LATITUDE-	LONGITUDE	δ ELEV. (FT.)	RECORD BEGAN	OBSERVER
Belen, Baja California	32° 12'	116° 29'	1,821	1965	** S. A. R. H.
El Carrizo, Baja California	32° 29'	116° 42'	1,624	1980	S. A. R. H.
El Hongo, Baja California	32° 31'	116° 18'	3,150	1980	S. A. R. H.
El Pinal, Baja California	" 32° 11'	116° 17'	" 4,429	1964	S. A. R. H.
La Rumorosa, Baja California	32° 33'	116° 03'	4,042	1945	S. A. R. H.
P. B. Rosarito, Baja California	32° 19'	117° 02'	72	1967	S. A. R. H.
Rodriguez Dam, Baja California	32° 27'	116° 54'	394	1938	S. A. R. H.
Tecate, Baja California	32° 33'	116° 41'	1,575	1946	S. A. R. H.
Valle de Las Palmas, Baja California	32° 22'	116° 37'	919	1948	S. A. R. H.
Valle Redondo, Baja California	32° 31'	116° 45'	794	1971	S. A. R. H.

δ Elevation above mean sea level
" Estimated from topographic maps
* County of San Diego is missing Potrero rainfall data
** Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE TIJUANA RIVER BASIN
IN INCHES

Tabulated below are records of evaporation observed at three stations in California and at four stations in Baja California, with averages for their periods of record. The stations in California are observed by Western Salt Company, city of San Diego, California, and the United States Section of the Commission; those in Baja California are observed by the Ministry of Agriculture and Hydraulic Resources of Mexico. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations," in this bulletin.

Types of pans used:

1. Barrett Reservoir: January 1921 through September 1926, square 3-foot by 3-foot by 18-inch deep floating pan. October 1926 through 1988, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.

2. Morena Reservoir: October 1915 through December 1921, square 3-foot by 3-foot by 18-inch deep floating pan. January 1922 through August 1926 records are the average of evaporation in a square 3-foot by 3-foot by 18-inch deep floating pan and a land pan of the same dimensions. September 1926 through 1988, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.

3. Lower Otay Dam: January 1950 through 1988, square 3-foot by 3-foot by 18-inch deep land pan set 15 inches in ground.

IN THE UNITED STATES

	Morena Dam, California		Barrett Dam, California		Lower Otay Dam, California			
Month	1988	Average 1916-1988	1988	Average 1921-1988	1988	Average 1950-1988		
Jan.	2.27	2.11	2.48	1.89	1.81	1.92		
Feb.	2.90	2.13	2.00	2.17	1.94	2.26		
Mar.	5.60	3.31	3.43	3.36	5.00	3.35		
Apr.	4.10	4.64	3.62	4.69	4.28	4.62		
May	7.01	6.51	4.99	6.62	6.48	6.12		
June	7.96	8.37	5.07	8.14	6.59	6.97		
July	10.15	9.61	5.76	9.62	6.87	8.40		
Aug.	7.68	8.90	5.42	9.03	6.51	7.88		
Sept.	6.57	7.07	5.02	7.36	5.98	6.45		
Oct.	4.84	4.95	3.51	5.16	4.16	4.63		
Nov.	2.02	3.20	1.99	3.20	2.30	2.79		
Dec.	2.19	2.29	1.60	1.99	2.25	2.11		
Yearly	63.29	63.09	44.89	63.23	54.17	57.50		

IN MEXICO

	Rodriguez Dam, Baja California		Valle de las Palmas Baja California		El Carrizo, Baja California			
Month	1988	Average 1939-1942 1946-1988	1988	Average 1952-1988	1988	Average 1980-1988		
Jan.	2.87	4.21	#	3.23	4.45	4.96		
Feb.	3.90	4.41	4.41	3.23	5.55	4.57		
Mar.	5.98	4.57	6.73	4.25	8.50	5.71		
Apr.	5.04	5.55	2.24	5.55	7.72	7.40		
May	6.89	5.04	8.70	5.47	10.12	8.54		
June	7.05	7.60	7.83	9.53	#	10.87		
July	7.72	8.62	10.71	10.35	#	11.18		
Aug.	7.13	7.95	8.46	9.53	#	10.87		
Sept.	5.87	6.69	7.32	7.52	#	9.06		
Oct.	3.90	5.51	5.20	5.20	#	7.64		
Nov.	2.44	4.45	3.90	3.62	#	5.31		
Dec.	2.80	3.46	2.68	2.72	#	4.09		
Yearly	61.57	68.54	-	72.91	-	89.68		

Missing record

TEMPERATURE IN THE TIJUANA RIVER BASIN
IN DEGREES FAHRENHEIT

The maximum, minimum, and monthly average temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few feet above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

	Barrett Dam, California				Campo, California				Chula Vista, California			
	1988			Average 1931-1988	1988			Average 1951-1988	1988			Average 1931-1988
Month	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	48.7	78	27	49.1	45.8	62	35	47.4	56.3	67	45	53.3
Feb.	53.2	83	28	50.8	52.1	67	37	48.5	59.8	73	47	54.6
Mar.	55.6	92	31	53.3	52.3	71	34	49.8	*	*	*	55.7
Apr.	56.3	90	36	57.6	55.9	72	39	53.5	61.8	71	53	58.3
May	63.0	95	38	62.7	60.5	80	41	60.3	63.7	72	56	60.9
June	66.4	96	41	68.5	65.3	86	44	67.0	64.4	71	58	63.4
July	75.6	100	49	76.1	73.4	94	52	75.0	70.4	76	65	67.3
Aug.	77.0	100	48	76.3	71.8	93	51	75.1	70.7	77	65	68.8
Sept.	70.6	102	43	72.3	67.0	88	46	70.5	*	*	*	67.6
Oct.	65.5	96	41	64.2	65.4	87	44	62.4	67.2	74	60	63.4
Nov.	54.9	95	29	55.3	52.4	69	36	53.9	60.0	69	51	58.4
Dec.	50.1	81	24	50.5	46.3	60	32	47.8	56.5	67	46	54.6
Yearly	61.4	102	24	61.4	59.0	94	32	59.3	-	-	-	60.5

IN MEXICO

	La Rumorosa, Baja California				Tecate, Baja California				Rodriguez Dam, Baja California			
	1988		1945-1988		1988		1946-1988		1988		1938-1988	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	66	21	81	5	79	28	100	16	82	36	90	27
Feb.	72	23	82	10	84	28	100	18	86	39	93	32
Mar.	81	30	88	16	97	28	97	23	100	39	100	32
Apr.	82	36	91	23	93	30	100	28	93	43	93	36
May	91	36	97	27	97	39	108	36	90	45	100	37
June	93	37	113	34	95	37	108	32	93	46	108	46
July	100	55	104	39	99	48	115	36	90	55	104	46
Aug.	93	57	102	46	100	45	117	34	97	54	106	50
Sept.	93	37	104	34	104	41	115	36	108	50	109	46
Oct.	88	46	99	25	100	41	106	27	93	50	108	34
Nov.	77	27	95	14	93	34	97	27	79	39	99	30
Dec.	70	37	84	10	*	*	97	23	84	34	102	27
Yearly	100	21	113	5	-	-	117	16	108	34	109	27

	Valle de las Palmas, Baja California				P. B. Rosarito, Baja California				El Pinal, Baja California			
	1988		1948-1988		1988		1967-1988		1988		1964-1988	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	82	32	91	12	75	46	93	36	66	25	77	3
Feb.	86	25	99	23	72	43	90	36	70	34	81	14
Mar.	100	30	100	28	*	*	90	34	82	36	84	19
Apr.	97	34	104	28	77	46	88	36	77	36	84	18
May	93	37	111	36	88	45	104	43	82	34	91	25
June	100	39	118	39	*	*	104	43	*	*	99	25
July	104	48	120	45	*	*	90	50	*	*	102	32
Aug.	106	45	118	41	79	50	93	50	86	41	104	32
Sept.	106	39	117	39	79	50	108	48	*	*	102	25
Oct.	102	43	109	32	79	50	100	43	88	39	95	23
Nov.	97	30	100	19	75	50	97	32	77	28	88	14
Dec.	86	28	95	21	*	*	90	36	70	23	79	10
Yearly	106	25	120	12	-	-	108	32	88	32	104	3

* Missing data

TEMPERATURE IN THE TIJUANA RIVER BASIN
IN DEGREES FAHRENHEIT

IN MEXICO

	Valle Redondo, Baja California				El Hongo, Baja California				El Carrizo, Baja California			
	1988		1974-1988		1988		1981-1988		1988		1980-1988	
Month	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	81	32	90	21	73	19	77	16	77	37	86	30
Feb.	90	32	95	23	73	32	81	21	88	37	88	28
Mar.	106	36	90	27	82	32	82	28	90	43	90	36
Apr.	93	36	102	32	84	34	86	30	93	43	95	39
May	102	39	106	39	91	34	100	34	108	41	108	41
June	95	41	113	41	95	36	102	36	*	*	106	48
July	106	46	111	48	100	54	106	45	*	*	109	52
Aug.	102	48	113	46	99	50	106	46	*	*	109	52
Sept.	106	46	115	19	97	43	97	37	*	*	106	48
Oct.	102	43	115	39	95	43	95	32	*	*	100	43
Nov.	93	37	97	28	84	30	84	28	*	*	95	39
Dec.	88	43	91	30	75	18	77	18	*	*	86	27
Yearly	106	32	115	19	100	18	106	16	-	-	109	27

	Belen, Baja California											
	1988		1965-1988									
Month	Max.	Min.	Max.	Min.								
Jan.	82	23	93	21								
Feb.	82	39	90	21								
Mar.	86	37	97	25								
Apr.	100	37	100	27								
May	95	39	104	32								
June	91	39	109	37								
July	102	48	113	39								
Aug.	95	41	113	41								
Sept.	102	41	111	34								
Oct.	95	41	104	21								
Nov.	90	36	93	25								
Dec.	77	36	91	19								
Yearly	102	23	113	19								

* Missing data

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS ALONG TIJUANA RIVER AND TRIBUTARIES

1988

The total area within the Tijuana River basin is 1,731 square miles, as determined from the best available maps from both the United States and Mexico. The drainage areas shown below are tabulated according to their downstream sequence.

The irrigated areas, tabulated in downstream sequence, are from the most reliable sources available. Those in the United States were furnished by the Tijuana River Valley Association or estimated from aerial photographs. Those in Mexico were furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico through the Mexican Section of the Commission. All irrigation in the Tijuana River basin in 1988 was by pumping from ground water.

Designation of Areas	Drainage Basin-Square Miles			Irrigated Areas-Acres		
	United States	Mexico	Total	United States	Mexico	Total
Cottonwood Creek above Morena Dam	114	0	114	0	0	0
Morena Dam to Barrett Dam	133	0	133	0	0	0
above Barrett Dam	247	0	247	0	0	0
below Barrett Dam and above Tecate Creek	65	0	65	0	0	0
above Tecate Creek	312	0	312	0	0	0
Campo Creek above International Boundary	85	4	89	0	0	0
Tecate Creek above International Boundary (not including Campo Creek)	19	64	83	0	0	0
Cottonwood Creek above International Boundary Station	413	68	481	0	0	0
Rio de las Palmas above Rodriguez Dam	7	981	988	0	(b) 0	0
Tijuana River above Nestor Gaging Station	458	1,266	1,724			
above the Mouth	462	1,269	1,731	(a) 898	0	898

(a) Data from Otay Water District, leased areas from IBWC irrigation and private landowners.
(b) There was no irrigation in 1988 in the Tijuana Irrigation District, Tijuana Valley, Baja California Mexico, from the Rodriguez Reservoir.


111°
110°
San Carlos Reservoir
Gila River
Calva
Winkelman
Gila River
33°
Pinal
Mammoth
Safford
Graham
UNITED STATES
Tucson
ARIZONA
Cochise
32°
Pima
Santa Cruz River
San Pedro River
Fairbank
Whitewater Draw
Rucker Canyon
Santa Cruz
Lewis Spgs.
Canelo
Patagonia
Nogales
Lochiel
Palominas
Bisbee
Douglas
Nogales
Naco
Agua Prieta
El Cajon
SONORA
31°
MEXICO
Cananea
INTERNATIONAL BOUNDARY & WATER COMMISSION
UNITED STATES & MEXICO
WESTERN INTERNATIONAL BOUNDARY
SANTA CRUZ RIVER, SAN PEDRO RIVER,
AND WHITEWATER DRAW BASINS
STREAM GAGING STATION
RAINFALL STATION
0 10 20 30 40 50 MILES
0 25 50 75 KILOMETERS

09-5375.00 WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

DESCRIPTION: Water-stage recorder located on U. S. Highway 80 bridge between Douglas and Bisbee, Arizona, about 450 feet (137 m) upstream from the Southern Pacific Railroad bridge, 1.5 miles (2.4 km) upstream from the international boundary, and 2 miles (3.2 km) west of Douglas, Arizona. Zero of gage is 3,909.14 feet (1,191.51 m) above mean sea level, U. S. C. & G. S. datum of 1929. Location April 26, 1972 to April 10, 1974 was 200 feet (61.0 m) upstream from bridge. Datum 4.40 feet (1.34 m) higher.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by the U. S. Section of the Commission. Records fair. Records available: August to October 1911 (gage heights and discharge measurements only), July to October 1912, January to June 1913, October 1913, December 1913 to June 1914, February to June 1915, October 1915 to September 1919,October 1919 to April 1922 (gage heights and discharge measurements only), July 1930 to December 1933, May 1935 to July 1947, October 1947 through 1988 (July 1954 to March 1955, monthly discharge only).

REMARKS: Diversions above this station are mainly by pumping from ground water for irrigation. Records show flow at the international boundary into Mexico except for some smelter waste water entering the stream a short distance below this station.

EXTREMES: Prior to 1936: Maximum recorded discharge, 3,450 second-feet (97.7 m3/sec) August 10, 1931 (gage height 12.15 feet (3.70 m); maximum estimated discharge, 4,050 second-feet (115 m3/sec) July 27, 1919; minimum discharge, no flow for several days of many years. Since 1936: Maximum discharge, 5,060 second-feet (143 m3/sec) August 7, 1955; maximum gage height, 16.55 feet (5.04 m) July 29, 1966; minimum daily discharge, no flow at times during most years.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	# 0	0	0	0	0	# 15.5	0.5	# 0	# 0	0
2	0	0	0	0	0	0	0	31.7	.4	0	0	0
3	0	0	0	0	# 0	0	0	22.4	48.9	0	0	# 0
4	0	0	0	0	0	0	0	51.9	47.5	0	0	0
5	0	0	0	0	0	0	0	68.8	1.0	0	0	0
6	0	0	0	0	0	0	0	14.8	.5	0	0	0
7	0	0	0	0	0	0	0	13.8	.4	0	0	0
8	0	0	0	0	0	0	0	58.8	.4	0	0	0
9	0	0	0	0	0	0	0	25.1	.3	0	0	0
10	0	0	0	0	0	0	0	1.0	.3	0	0	0
11	0	0	0	0	0	0	0	.5	11.2	0	0	0
12	1.1	0	0	0	0	0	0	.4	17.8	0	0	0
13	.5	0	0	0	0	0	0	.4	35.6	0	0	0
14	.2	0	0	0	0	0	0	.3	1.9	0	0	0
15	.2	0	0	0	0	0	0	1.9	.6	28.0	0	0
16	.1	0	0	0	0	0	0	16.3	.5	61.4	0	0
17	.1	0	0	0	0	0	0	10.6	.4	13.2	0	0
18	.1	0	0	0	0	0	0	2.2	.3	.6	0	0
19	.1	0	0	0	0	0	.4	2.9	.3	.1	0	0
20	0	0	0	0	0	0	.2	22.3	.2	11.5	0	0
21	0	0	0	0	0	0	0	41.0	5.6	36.1	0	0
22	0	0	0	0	0	0	0	93.0	4.4	1.8	0	0
23	0	0	0	0	0	0	0	13.5	.4	.1	0	0
24	0	0	0	0	0	0	0	3.2	.3	.1	0	0
25	0	0	0	0	0	0	0	.9	.2	" .1	0	0
26	0	0	0	0	0	0	0	6.4	.1	" .1	0	0
27	0	0	0	0	# 0	0	0	# 44.6	.1	" 0	0	0
28	0	0	0	0	0	# 0	0	28.5	0	" 0	0	0
29	# 0	0	0	0	0	0	1.8	13.4	0	" 0	0	0
30	0		0	0	0	0	14.9	.8	0	" 0	0	# 0
31	0		# 0		0		5.3	.6		" 0		0
Sum	2.4	0	0	0	0	0	22.6	607.5	180.1	153.1	0	0

Month	Current Year 1988								Period 1936-1988		
	Extreme Gage Feet		Extreme Second-Feet				Average Second-Feet	Total Acre-Feet	Acre-Feet		
			High		Low						
	High	Low	Day		Day				Average	Maximum	Minimum
Jan.	5.34	4.65	12	3.6	! 1	0	0.1	4.8	34.0	451	0
Feb.	4.65	4.65		0		0	0	0	17.2	132	0
Mar.	4.65	4.65		0		0	0	0	23.8	295	0
Apr.	4.65	4.65		0		0	0	0	17.5	173	0
May	4.65	4.65		0		0	0	0	11.9	138	0
June	4.65	4.65		0		0	0	0	114	1,590	0
July	6.46	4.65	30	23.5	! 1	0	.7	44.8	1,780	8,110	0
Aug.	8.26	4.82	22	172	!14	.2	19.6	1,205	2,896	14,480	0
Sept.	7.89	4.86	! 3	125	!28	0	6.0	357	755	3,170	0
Oct.	7.61	4.86	16	95.2	! 1	0	4.9	304	356	6,103	0
Nov.	4.89	4.86	! 1	0	! 1	0	0	0	32.3	352	0
Dec.	4.86	4.86	! 1	0	! 1	0	0	0	112	2,363	0
	8.26	4.65		172		0	2.6	1,916	6,150	22,321	235
Yearly	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
	2.52	1.42		4.87		0	0.07	2,363	7,586	27,533	290

! And other days " Estimated # Measurement or observation of zero flow

SEWAGE INFLUENT, DOUGLAS, ARIZONA
INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Parshall flume in the influent line of the older trickling filter unit and a Parshall flume in the influent line of the newer extended aeration unit. The treatment plant is located about one mile (1.6 km) west of the Douglas-Agua Prieta Port of Entry immediately adjacent to the international boundary in Douglas, Cochise County, Arizona.

RECORDS: Continuous monthly records since March 1948; daily records from March 18, 1948 through 1950 and from January 1952 through 1988.

REMARKS: The older 1.3 mgd trickling filter unit was constructed in 1947 by the International Boundary and Water Commission. Since April 8, 1968 all sewage from Agua Prieta has been retained in Mexico to be used for irrigation along with the effluent from the Douglas International Treatment Plant. On July 1, 1973, ownership and operation of the plant was transferred from the International Boundary and Water Commission to the city of Douglas. In 1980 the plant was enlarged, with the addition of the extended aeration unit bringing the total capacity up to 2.6 mgd. The effluent from the Douglas Treatment Plant is discharged through a closed conduit to Mexico.

	Total Monthly Flows			Mean Daily Flows-Millions of Gallons Per Day					
	Millions of Gallons			Current Year 1988			Period 1952-1988		
Month	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	41.413	0	41.413	1.562	1.108	1.336	2.157	0.416	1.105
Feb.	38.881	0	38.881	1.475	1.178	1.341	1.784	.543	1.108
Mar.	41.334	0	41.334	1.642	.945	1.333	1.932	.590	1.109
Apr	40.245	0	40.245	1.633	1.078	1.341	2.047	.380	1.110
May	42.568	0	42.568	1.741	1.078	1.373	1.850	.510	1.114
June	40.180	0	40.180	1.600	1.060	1.339	2.060	.555	1.164
July	41.782	0	41.782	1.511	1.155	1.348	3.209	.483	1.212
Aug.	42.155	0	42.155	1.823	.907	1.359	2.681	.365	1.228
Sept.	40.497	0	40.497	1.473	1.227	1.350	2.107	.470	1.186
Oct.	41.616	0	41.616	1.543	1.137	1.342	2.154	.603	1.150
Nov.	40.921	0	40.921	2.085	.641	1.364	2.390	.320	1.130
Dec.	42.086	0	42.086	2.091	.614	1.357	3.330	.500	1.128
Yearly	493.678	0	493.678	2.091	0.614	1.349	3.330	0.320	1.145

SEWAGE INFLUENT, AGUA PRIETA, SONORA
INTERNATIONAL OXIDATION PONDS

DESCRIPTION: Parshall flume equipped with staff gage in influent line to oxidation ponds. Since April 8, 1968, all sewage from Agua Prieta, Sonora has been diverted to oxidation ponds, which are located in Mexico; if necessary, sewage from Douglas, Arizona may be included, but this has never been done.

RECORDS: Discharges are computed from daily 11:00 a.m. readings of the staff gage by applying an index for that hour, determined from 7 days of hourly measurements from which the relationship between mean daily readings and 11:00 a.m. readings was developed. Records available: Mean daily flows from April 8, 1968 through 1984.

REMARKS: The construction of the international oxidation ponds in Agua Prieta, Sonora was completed in April 1968 by the government of Mexico, fulfilling an international agreement to solve the problem of insufficient capacity at the international treatment plant in Douglas, where the combined flows from Douglas and Agua Prieta were treated. If necessary, sewage from Agua Prieta may be treated in this plant, but since the completion of the oxidation ponds, this has never been done. The ponds are located 1.6 miles (2.6 km) south of international monument 85a.

DATA NOT AVAILABLE

09-4705.00 SAN PEDRO RIVER AT PALOMINAS, ARIZONA

DESCRIPTION: Water-stage recorder located near left bank on downstream side of the bridge pier at Highway 92, 0.7 mile (1.1 km) east of Palominas, 2.5 miles (4.0 km) upstream from Green Brush Draw, 4.5 miles (7.2 km) downstream from international boundary, and 12 miles (19 km) southwest of Bisbee, Arizona. Zero of gage is 4,187.62 feet (1,276.39 m) above mean sea level (State Highway bench mark).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records available: May 1930 to October 1933, May 1935 to July 1941, and July 1950 through 1988. Records obtained and furnished by U. S. Geological Survey to September 30, 1981; thereafter by the United States Section of the Commission.

REMARKS: There are some small diversions for irrigation of a few hundred acres above this station, mostly in Mexico. Record shows approximate flow of river at international boundary.

EXTREMES: Maximum daily discharge, 22,000 second-feet (623 m3/sec) on August 14, 1940 (gage height 16.16 feet (4.93 m) present datum), from rating curve extended above 5,600 second-feet (159 m3/sec) on basis of slope-area measurement of peak flow; no flow at times in most years. Greatest flood known occurred on September 28, 1926 (gage height, about 23.9 feet (7.28 m) present datum, from flood marks; discharge not determined.

Mean Daily Discharge in Second-Feet 1988 — Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.7	4.9	* 4.3	3.0	0.2	0	0	* 39.4	13.4	3.8	* 25.2	7.2
2	3.2	4.6	" 5.3	2.7	.1	0	0	67.0	7.2	3.3	22.4	6.2
3	3.0	4.0	" 5.1	3.5	* .3	0	0	415	4.9	3.2	20.8	* 6.4
4	3.1	3.5	" 4.8	3.6	0	0	0	235	3.6	2.9	19.7	6.6
5	4.0	4.0	" 4.6	3.2	0	0	0	94.0	2.3	1.9	18.9	7.6
6	4.4	3.9	" 4.3	3.6	0	0	0	61.6	1.3	2.5	16.9	7.7
7	4.4	3.4	" 4.1	3.8	.1	0	27.4	270	.7	1.8	15.9	8.2
8	4.7	3.3	" 3.8	3.3	0	0	18.4	425	.5	* 1.5	15.2	8.7
9	5.4	2.4	3.6	1.7	.1	0	3.7	476	.3	3.1	14.3	8.2
10	5.6	1.8	" 4.3	1.1	0	0	.6	94.9	0	3.6	13.4	8.7
11	5.8	1.6	" 4.1	.9	0	0	.4	56.9	1,470	17.7	11.7	8.0
12	5.9	1.8	" 3.9	.5	0	0	1.8	41.9	717	6.3	10.5	7.8
13	5.1	2.1	" 3.7	.5	0	0	4.3	33.1	163	3.3	9.5	7.4
14	5.2	2.5	" 3.6	2.1	0	0	.6	29.5	78.0	100	9.7	7.1
15	5.4	3.4	" 3.4	1.3	0	0	.5	31.6	44.6	335	9.8	6.4
16	5.3	3.6	" 3.2	1.8	0	0	.3	67.4	26.8	54.1	9.4	5.8
17	4.9	* 3.7	" 3.0	2.2	0	0	.3	38.5	19.1	25.0	10.5	5.7
18	7.5	" 3.7	" 2.8	2.1	0	0	9.5	29.2	13.5	16.1	10.3	6.4
19	7.2	" 3.8	" 2.6	1.8	.2	0	29.4	70.0	10.7	37.0	10.1	5.9
20	6.2	" 3.8	" 2.4	1.1	0	0	195	378	10.7	224	10.9	5.9
21	6.0	" 3.9	" 2.2	.9	0	0	29.9	55.9	24.7	95.8	10.8	5.7
22	5.6	" 3.9	" 2.1	1.1	0	0	17.3	48.5	15.9	194	10.8	5.0
23	4.9	" 4.0	" 1.9	1.1	0	0	14.5	147	10.8	124	10.4	5.0
24	4.5	" 4.0	" 1.7	.9	0	0	12.6	348	10.1	74.1	9.9	4.6
25	4.1	" 4.1	" 1.5	.8	0	0	12.0	563	8.5	56.2	11.2	4.7
26	4.4	" 4.1	1.3	.9	0	0	216	175	7.2	47.4	10.0	4.8
27	4.7	" 4.2	1.2	.7	* 0	0	52.8	939 *	6.1	40.0	8.8	5.4
28	5.3	" 4.2	1.0	.8	0	* 0	51.6	581	5.9	37.4	9.2	6.2
29	* 5.2	" 4.3	1.4	1.0	0	0	118	124	4.9	38.7	8.4	7.6
30	5.2		1.8	.6	0	0	167	47.9	4.2	31.7	7.9	* 7.1
31	5.0		*" 2.3		0		50.6	23.5		27.7		6.7
Sum	154.9	102.5	95.3	52.6	1.0	0	1,034.5	6,007.6	2,685.9	1,613.1	382.5	204.7

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	Extreme Second-Feet High Day	Extreme Second-Feet High	Extreme Second-Feet Low Day	Extreme Second-Feet Low	Average Second-Feet	Total Acre-Feet	Period 1951-1988 Acre-Feet Average	Maximum	Minimum
Jan.	3.29	3.13	!18	8.7	! 2	1.9	5.0	307	1,558	27,763	2.6
Feb.	3.23	3.12	! 1	5.1	!10	1.2	3.5	203	800	6,764	3.0
Mar.	3.25	3.04	2	6.7	28	.6	3.1	189	713	7,401	13.3
Apr.	3.21	3.00	8	5.1	30	0	1.8	104	183	1,039	0
May	3.06	2.93	3	.9	! 1	0	0	2.0	66.4	407	0
June	2.88	2.88		0		0	0	0	146	1,391	0
July	6.07	2.88	29	919	! 1	0	33.4	2,052	5,264	17,238	0
Aug.	8.34	3.50	27	2,670	31	16.0	194	11,916	8,439	36,369	165
Sept.	12.00	2.27	11	7,130	! 9	0	89.5	5,327	1,994	16,344	11.3
Oct.	5.70	2.16	15	841	7	.8	52.0	3,200	1,998	47,322	0
Nov.	2.96	2.86	1	26.5	129	6.7	12.8	759	279	2,563	0
Dec.	3.21	2.87	29	25.4	24	3.5	6.6	406	1,719	25,479	6.2
Yearly	12.00	2.16		7,130		0	33.7	24,465	23,159	62,788	4,400
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
	3.66	0.66		202		0	0.95	30,177	28,566	77,448	5,427

! And other days " Estimated * Measurement or observation of zero flow

09-4800.00 SANTA CRUZ RIVER NEAR LOCHIEL, ARIZONA

DESCRIPTION: Water-stage recorder located in the United States near left bank on the downstream side of concrete bridge pier of county highway bridge, 2.5 miles (4.0 km) northeast of Lochiel, Arizona, and 1.7 miles (2.7 km) upstream from the international land boundary. The elevation of the zero of the gage has not been determined, but topographic maps indicate the elevation of the stream bed at the gage is about 4,620 feet (1,408 m).
RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: January 1949 through 1988.
REMARKS: There are small diversions by ground water pumping for irrigating about 200 acres (80.9 ha) above this station.
EXTREMES: Maximum discharge, 12,800 second-feet (362 m3/sec) on August 15, 1984 (gage height 10.47 feet) (3.19 m); minimum discharge, no flow for several days of many years.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.80	0.80	0.84	0.58	0.45	0.34	0.26	5.0	3.8	3.2	1.7	1.2
2	.80	.81	.91	.61	.46	.34	.26	3.7	4.5	3.1	1.6	1.1
3	.80	.84	.84	.62	.46	.25	.26	7.5	5.4	3.1	1.5	1.1
4	.80	.80	.80	.64	.45	.18	.30	1.8	5.6	3.1	1.5	1.2
5	.82	.80	.80	.63	.46	.12	.29	.74	6.0	3.0	1.5	1.2
6	.85	.80	.80	.66	.49	.10	.19	2.6	6.1	3.1	1.4	1.2
7	.85	.80	.80	.67	.52	.10	.22	.92	6.1	2.9	1.4	1.2
8	.85	.80	.81	.67	.49	.09	.34	.79	6.0	2.9	1.3	1.2
9	.85	.83	.80	.66	.49	.09	.27	.77	6.0	2.9	1.3	1.2
10	.85	.80	.82	.67	.49	.12	.29	.74	6.0	2.7	1.3	1.2
11	.85	.76	.83	.67	.49	.16	.33	.73	10	2.9	1.3	1.2
12	.85	.76	.81	.65	.49	.21	.33	.71	21	2.8	1.3	1.2
13	.85	.76	.83	.68	.47	.23	.31	.71	6.2	2.6	1.3	1.2
14	.85	.76	.83	.71	.35	.27	.29	.75	5.8	3.9	1.3	1.3
15	.85	.76	.82	.67	.33	.31	.28	.78	5.5	6.8	1.3	1.4
16	.85	.76	.83	.71	.35	.31	.30	.73	5.4	3.2	1.3	1.4
17	.86	.76	.82	.65	.33	.31	.31	.75	5.3	2.5	1.2	1.4
18	1.1	.78	.80	.61	.36	.30	.37	.76	5.1	2.2	1.1	1.4
19	1.0	.80	.80	.58	.38	.33	.57	.76	4.9	2.3	1.1	1.4
20	.90	.80	.80	.60	.43	.34	.50	.81	5.4	7.8	1.1	1.3
21	.85	.80	.79	.65	.45	.35	.43	.84	5.2	2.6	1.1	1.3
22	.86	.80	.76	.67	.46	.31	.41	16	4.7	2.6	1.1	1.3
23	.89	.80	.73	.63	.46	.31	.37	74	4.4	2.2	1.1	1.3
24	.83	.80	.63	.47	.46	.31	.56	6.5	4.1	2.0	1.1	1.3
25	.80	.80	.60	.38	.46	.32	.57	1.4	3.9	1.9	1.3	1.3
26	.80	.80	.58	.37	.45	.32	.69	1.4	3.8	1.8	1.4	1.3
27	.80	.81	.59	.39	.36	.31	12	12	3.7	1.8	1.3	1.2
28	.80	.88	.55	.46	.28	.28	4.8	3.1	3.6	1.7	1.2	1.3
29	.80	.95	.54	.47	.24	.26	.60	1.9	3.5	1.7	1.2	1.2
30	.80		.52	.46	.25	.26	6.5	2.0	3.4	1.8	1.2	1.2
31	.80		.55		.31		2.1	2.9		1.8		1.2
Sum	26.26	23.22	23.23	17.89	12.92	7.53	35.30	154.09	170.4	88.9	38.8	38.9

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	ø Extreme Second-Feet High Day	High	Low Day	Low	Average Second-Feet	Total Acre-Feet	Period 1949-1988 Acre-Feet Average	Maximum	Minimum
Jan.			18	1.1	! 1	0.80	0.85	52.1	163	2,895	1.3
Feb.			29	.95	!11	.76	.80	46.1	93.5	1,000	1.8
Mar.			2	.91	30	.52	.75	46.1	115	2,103	.7
Apr.			!14	.71	26	.37	.60	35.5	43.4	308	0
May			7	.52	29	.24	.42	25.6	23.4	170	0
June			21	.35	! 8	.09	.25	14.9	17.6	169	0
July			27	12	6	.19	1.1	70.0	520	4,270	1.6
Aug.			23	74	!12	.71	5.0	306	1,082	11,518	.1
Sept.			12	21	30	3.4	5.7	338	330	2,634	0
Oct.			20	7.8	!28	1.7	2.9	176	322	4,732	0
Nov.			1	1.7	!18	1.1	1.3	77.0	64.4	403	0
Dec.			!15	1.4	! 2	1.1	1.3	77.2	115	1,093	0
Yearly				74		0.09	1.7	1,265	2,889	17,376	126
	Meters			Cubic Meters per Second				Thousands of Cubic Meters			
				2.10		0	0.05	1,560	3,564	21,433	155

ø Mean daily ! And other days

09-4805.00 SANTA CRUZ RIVER NEAR NOGALES, ARIZONA

DESCRIPTION: Water-stage recorder, cable with sit-down cable car located 5.5 miles (8.9 km) east of Nogales, Arizona, 0.8 mile (1.3 km) downstream from the international boundary and 6 miles (9.7 km) upstream from the Santa Cruz bridge on State Highway No. 82. Zero of gage is 3,702.54 feet (1,128.53 m) above mean sea level, U. S. C. & G. S. datum (levels by International Boundary and Water Commission).
RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: March to November 1907 and April 1909 to December 1912 (discharge measurements and fragmentary gage height record);January 1913 to June 1922 (October 1915 to September 1916, monthly discharges only); May 1930 to December 1933; and July 1935 through 1988.
REMARKS: Diversions in both countries affect the flow at this station. The major diversions occur in Mexico for domestic and irrigation uses. There are no storage dams above the station as of December 1988.
EXTREMES: Maximum discharge, 33,500 second-feet (949 m3/sec) on October 9, 1977 (gage height 15.5 feet) (4.72 m); minimum discharge, no flow for several days of many years.

Mean Daily Discharge in Second-Feet 1988 —— Annual and Period Summary

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	" 2.6	14	7.6	2.4	1.6	0.59	0	39	37	5.1	11	7.3
2	" 2.6	14	12	2.3	1.5	.59	0	18	27	5.2	9.3	7.3
3	" 2.6	14	14	2.3	1.3	.56	0	20	23	5.2	9.1	6.9
4	" 2.6	14	12	2.3	1.1	.50	0	8.5	19	5.4	8.7	6.7
5	" 2.6	16	10	2.2	.78	.45	0	7.1	15	5.7	8.8	6.7
6	" 2.6	13	9.9	2.0	.61	.43	0	3.7	13	5.2	8.7	6.2
7	" 2.6	13	9.1	1.8	.58	.43	0	20	12	5.2	8.4	6.2
8	2.6	13	8.2	1.9	.65	.33	0	39	9.5	5.1	8.0	6.4
9	2.6	12	8.2	1.8	.84	.28	0	17	7.3	4.5	8.4	6.6
10	2.7	12	8.1	1.6	.89	.28	0	1.8	5.8	4.5	8.2	6.6
11	3.0	11	7.4	1.7	.92	.21	5.4	12	141	4.6	8.2	6.5
12	3.0	11	6.5	1.7	.86	.21	.47	9.8	934	4.3	7.9	6.5
13	3.0	10	6.5	3.1	.82	.14	.21	3.0	253	4.2	7.7	6.5
14	3.0	9.2	6.3	6.6	.73	.14	0	3.5	102	21	7.8	6.8
15	3.3	8.8	5.9	4.9	.66	.14	0	.96	75	40	7.9	7.6
16	3.5	9.7	5.5	13	.71	.14	0	.42	54	24	8.5	7.8
17	7.0	9.7	5.4	6.4	.56	.14	0	.34	37	18	8.1	7.8
18	17	9.1	5.3	4.4	.46	.14	18	.28	29	14	6.8	7.3
19	" 34	8.4	4.5	3.6	.45	.20	34	7.4	23	12	7.4	7.5
20	21	7.6	3.9	2.8	.43	.27	7.8	1.0	20	48	7.6	6.4
21	16	7.6	3.9	2.7	.36	.41	33	.29	21	29	7.9	6.5
22	14	7.6	3.6	2.8	.34	.23	27	5.4	18	29	7.6	6.4
23	13	7.6	3.5	2.4	.39	.08	1.2	169	14	29	7.5	6.3
24	13	7.6	3.8	2.2	.50	.07	.33	483	12	24	7.2	6.2
25	13	7.6	3.8	2.1	.57	.01	.14	276	11	19	8.0	6.0
26	14	8.4	3.7	2.2	.59	0	3.5	141	9.6	18	8.6	6.7
27	13	8.4	3.5	1.9	.56	0	22	152	8.9	16	8.8	6.2
28	13	8.4	3.6	2.0	.52	0	53	200	7.8	15	7.9	6.0
29	14	7.6	3.1	2.2	.52	0	28	127	6.7	14	7.5	5.8
30	14		2.9	1.7	.54	0	55	90	6.4	14	7.6	5.8
31	14		2.5		.60		42	59		13		5.2
Sum	274.9	300.3	194.2	91.0	21.94	6.97	331.05	1,915.49	1,952.0	461.2	245.1	204.7

Month	Current Year 1988 Extreme Gage Feet High	Extreme Gage Feet Low	ø Extreme Second-Feet High Day	High	Low Day	Low	Average Second-Feet	Total Acre-Feet	Period 1936-1988 Acre-Feet Average	Maximum	Minimum
Jan.			19	" 34	! 1	" 2.6	8.9	545	2,156	30,282	0
Feb.			5	16	!20	7.6	10	596	1,717	20,547	0
Mar.			3	14	31	2.5	6.3	385	1,463	19,575	0
Apr.			16	13	10	1.6	3.0	180	393	2,955	0
May			1	1.6	22	.34	.71	43.5	118	1,031	0
June			! 1	.59	!26	0	.23	13.8	87.8	1,449	0
July			30	55	! 1	0	11	657	2,735	15,610	16.9
Aug.			24	483	18	.28	62	3,799	5,733	45,790	91.0
Sept.			12	934	10	5.8	65	3,872	1,570	9,431	0
Oct.			20	48	13	4.2	15	915	1,924	59,025	0
Nov.			1	11	18	6.8	8.2	486	547	7,384	0
Dec.			!16	7.8	31	5.2	6.6	406	2,551	33,568	0
Yearly				934		0	16	11,898	20,995	87,615	2,234
	Meters		Cubic Meters per Second					Thousands of Cubic Meters			
				26.5		0	0.45	14,676	25,897	108,071	2,756

ø Mean daily ! And other days " Estimated

SEWAGE INFLUENT, NOGALES INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Three 24-inch (61.0 cm) Parshall flumes, each with a water-stage recorder and continuous totalizer, one located at the international boundary for measuring effluent from Nogales, Sonora, one located at the head of the treatment plant, and one in the plant effluent line. Nogales International Treatment Plant is located adjacent to I-19, approximately 9 miles (14.5 km) north of the international boundary, all within the city of Nogales, Santa Cruz County, Arizona.

RECORDS: Flows from the United States are deduced from total plant influent less the flows measured crossing the international boundary from Mexico. Records available: Continuous monthly record for plant influent since August 1951; daily records for plant influent, January 1952 through 1988.

REMARKS: Prior to December 18, 1971 the plant was located along the right bank of Nogales Wash, approximately two miles (3.2 km) north of the international boundary. Nogales International Treatment Plant treats combined sewage from both Nogales, Arizona and Nogales, Sonora by means of aerated stabilization lagoons with a capacity of 8.2 mgd. Chlorinated plant effluent is discharged directly to the Santa Cruz River.

	Total Monthly Flows Millions of Gallons			Mean Daily Flows-Millions of Gallons Per Day					
				Current Year 1988			Period 1952-1988		
Month	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	95.205	189.111	284.316	13.508	7.368	9.171	13.508	0.650	4.004
Feb.	91.907	171.337	263.244	10.082	8.273	9.077	14.706	.650	4.186
Mar.	95.783	177.672	273.455	9.953	7.562	8.821	18.861	.750	4.156
Apr.	87.317	169.721	257.038	9.824	7.691	8.568	11.335	.700	3.961
May	86.736	162.805	249.541	8.725	7.109	8.050	9.565	.550	3.747
June	80.015	145.937	225.952	8.014	6.916	7.532	9.006	.700	3.533
July	79.693	184.328	264.021	11.117	6.140	8.517	13.667	.700	3.754
Aug.	129.055	180.272	309.327	11.634	8.467	9.978	13.120	.750	4.139
Sept.	129.580	168.820	298.400	11.375	9.436	9.947	12.312	.800	4.371
Oct.	134.741	177.105	311.846	13.443	8.919	10.060	13.443	.700	4.265
Nov.	127.386	184.073	311.459	10.793	9.565	10.382	10.793	.800	4.136
Dec.	119.098	170.902	290.000	10.147	8.079	9.355	15.605	.350	4.140
Yearly	1,256.516	2,082.083	3,338.599	13.508	6.140	9.122	18.861	0.350	4.033

RAINFALL ON THE SANTA CRUZ RIVER WATERSHED
IN INCHES

Tabulated below are the monthly records of rainfall with averages for their periods of record at stations located in Arizona. Two stations are operated and maintained by the United States Section of the Commission and two by the National Weather Service. For location, elevation, period of record, type of gage in use, and the observer, see alphabetical listing of stations on this page.

IN THE UNITED STATES

Month	San Rafael #2, Arizona		Canelo, Arizona		Patagonia, Arizona		Nogales Sanitation Plant 9N, Arizona			
	1988	Average 1973-1988	1988	Average 1930-1988	1988	Average 1930-1988	1988	Average 1953-1988		
Jan.	2.25	1.62	1.50	1.21	1.97	1.27	1.56	1.15		
Feb.	.70	1.32	.15	1.07	.30	1.08	.57	.78		
Mar.	0	1.26	.40	.87	.41	.93	.57	.88		
Apr.	2.00	.60	1.90	.43	1.60	.41	2.83	.33		
May	0	.19	0	.15	0	.18	0	.23		
June	0	.56	.49	.77	.07	.48	.04	.40		
July	6.60	5.20	4.34	4.16	6.55	4.42	7.21	4.85		
Aug.	5.19	3.75	3.85	4.26	6.29	4.11	4.42	3.90		
Sept.	2.60	2.37	1.33	1.80	.45	1.79	.28	1.69		
Oct.	4.04	1.44	1.28	1.01	3.72	1.11	3.45	1.36		
Nov.	1.12	.97	.84	.81	.68	.81	.31	.64		
Dec.	.20	1.37	.14	1.40	.28	1.41	.22	1.44		
Yearly	24.70	20.65	16.22	17.94	22.32	18.00	21.46	17.65		

LOCATION OF RAINFALL STATIONS ON THE SANTA CRUZ RIVER WATERSHED

The precipitation records of the stations listed alphabetically below begin on the date shown and extend through 1988.

IN THE UNITED STATES

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (FT.)	RECORD BEGAN	OBSERVER
Canelo, Arizona	S	31° 33'	110° 32'	5,010	1930	R. E. Ewing
Nogales Sanitation Plant 9N, Arizona	S	31° 25'	110° 57'	3,560	June 1952	I. B. & W. C.
Patagonia, Arizona	S	31° 33'	110° 45'	4,190	1930	George R. Proctor
San Rafael #2, Arizona	S	31° 22'	110° 38'	4,860	Jan. 1973	I. B. & W. C.

S Standard 8" rain gage

TEMPERATURE IN THE SANTA CRUZ RIVER BASIN IN DEGREES FAHRENHEIT

Tabulated below are monthly records of temperature at the station located at the Nogales Sanitation Plant in Arizona 9 miles (14.5 km) north of the international boundary. On December 18, 1971, the station was moved to correspond with a new Nogales Sanitation Plant. Prior to this date, the station was located 2 miles (3.2 km) north of the international boundary at the old Nogales Sanitation Plant. This station is operated and maintained by the United States Section of the Commission. The equipment at the Nogales Sanitation Plant - 9N consists of a standard 8-inch (203 mm) rain gage and maximum and minimum thermometer. The collection of data for mean relative humidity, evaporation, and mean wind speed was discontinued in 1984.

For specific location of this station, refer to data opposite same station name shown in "Location of Rainfall Stations," in this bulletin.

	Nogales Sanitation Plant - 9N		
	1988		
Month	Mean	Max.	Min.
Jan.	46.1	79	17
Feb.	50.3	78	21
Mar.	52.2	92	18
Apr.	58.6	87	25
May	66.0	98	29
June	75.8	105	39
July	79.3	100	59
Aug.	78.0	99	60
Sept.	70.7	100	41
Oct.	66.6	93	42
Nov.	52.6	87	19
Dec.	45.5	78	10
Yearly	61.8	105	10

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS ALONG SANTA CRUZ RIVER, SAN PEDRO RIVER, AND WHITEWATER DRAW

1988

The drainage basin areas tabulated below are derived from the best available maps from both the United States and Mexico.

Data on irrigated areas in the Whitewater Draw Basin were furnished by the Soil Conservation Service at Douglas, Arizona and estimated from aerial photographs.

Designation of Areas	Drainage Basin - Square Miles			Irrigated Areas - Acres		
	United States	Mexico	Total	United States	Mexico	Total
Santa Cruz River:						
Above Lochiel, Arizona Gaging Station	82	0	82	100	0	100
Above El Cajon, Mexico Gaging Station	179	125	304	100	2,352	2,452
Above Nogales, Arizona Gaging Station	185	348	533	100	2,696	2,796
San Pedro River:						
Above Palominas, Arizona Gaging Station	92	649*	741	2,000	3,459	5,459
Whitewater Draw:						
Above Douglas, Arizona Gaging Station	1,023	0	1,023	22,000	0	22,000

* An additional 47 square miles in Mexico is tributary to the San Pedro River downstream from this station.